The Builder.

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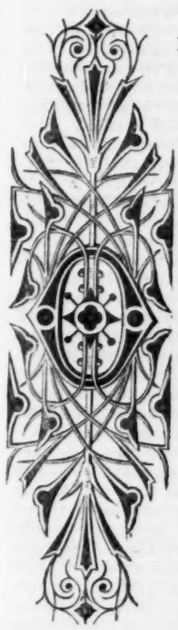
The Globe Theatre, London.



N part of the site of Lyon's Inn, between Holywell-street and Wych-street, with a narrow frontage in Newcastle-street, a Theatre has been built, and, under the title of The Globe, was opened for public performances on Saturday evening, the 28th ult. In Lyon's Inn (formerly a hostelry, with the sign of the Lion, purchased by professors of the law in the reign of Henry VIII., and made an inn of Chancery), the Architectural Association, as many of our readers know, had its first home. The site was then taken by the luckless Strand Hotel Company, part of whose ruins, at the end of Newcastle-street, still disfigure the Strand.

The site having been excavated very considerably for the proposed hotel, the floor of the pit has been made many feet below the street-level, and is approached by a steep flight of steps from Wych-street, the pay-place being at the bottom,—a very undesirable, not to say dangerous, arrangement. A sad disaster at the Haymarket Theatre, some years ago, where a similar, but now improved, arrangement exists, will long be remembered, though the warning, it would seem, has had little effect. In Wych-street, also, are the entrance to the gallery-stairs, and that to the royal box. The ordinary boxes are entered from Newcastle-street, and are on a level with the street, so that stairs are avoided; here, too, enter the occupants of the stalls. The box-circle has five rows of seats, part being regarded as the dress-circle (at 4s. each seat), and the remainder as ordinary box seats, at 2s. 6d. The admission-money to the pit is 1s. 6d. Above the boxes is a large gallery, the front row of seats in it being treated as amphitheatre stalls. The front line of the boxes forms nearly a circle, cut off at about two-thirds of its extent by the proscenium. The ceiling is domical, with a sun-light in the centre. The seats are all fairly commodious, and there would seem to be very few places in the house where what is passing on the stage cannot be seen and heard. The draught is disagreeable in some of the back seats of the boxes, and the want of a centre passage through the pit seats is obvious. The draughts in many of our theatres keep away hundreds who would otherwise be visitors.

The Globe has been built from the instructions of Mr. Sefton Parry, the proprietor, by Mr. Samuel Simpson, of Tottenham-court-road, who built the Holborn Theatre, the Queen's, the Royal Alfred, and is now engaged on the Gaiety, in the Strand. It will seat 1,500 persons, exclusive of the eight private boxes. Mr. W. Brown was the clerk of the works.

The whole of the interior decorations in relief, comprising the dome and perforated rib round it, the proscenium, and the gallery and box fronts, were designed and executed by Messrs. White & Co., of Great Marylebone-street, in their *papier mâché* and *carton pierre*. The view we give* shows the character of the ornaments, and we may say that they are well drawn, and produced with sharpness and precision. The material offers great facilities for rapid work: thus the ceiling here was executed in the shops, and screwed up in compartments complete.

White with gold is the prevailing colour, if colour it may be called, a little blue being introduced around the anthemion, along the bottom of the box-fronts. The crimson curtains of the private boxes, with gilded frames, are effective. The appearance of the whole, indeed, now the work is new, is bright and "smiling."

An act-drop representing Stratford-on-Avon, the birth-place of Shakspeare, was painted by the Messrs. Telbin, and is spoken of as having been one of the most successful results of their skill. Unfortunately, however, it was consumed by the fire that destroyed the painting-rooms in Charles-street, Drury-lane, mentioned in our last. Mr. Buckstone immediately offered Mr. Parry one that he had in store at the Haymarket, but Mr. Telbin and his son, with a numerous staff of assistants, went to work, and produced in time for the opening, an effective view of Ann Hathaway's Cottage, at Shottery; with two figures, doubtless intended to suggest the poet and his future wife. The scene shows Telbin "hath a way" as well as a representation of Ann.

The stage appears to possess all the necessary appliances for rapid and effective representation, so far as we have yet gone in that direction, but we cannot speak well of the accommodation behind. The dressing-rooms are insufficient in number, and not what they ought to be in arrangement; and, strange to say, there is no green-room, with a view, as we have been told, to avoid "noise." The performers engaged are, therefore, driven to the dressing-rooms, or to holes and corners, when not on the stage. A more certain way to degrade the profession than by inattention to the dignity, comfort, and requirements of its professors behind the scenes, we do not know.

The play with which the house opened, "Cyril's Success," by Mr. Byron, is itself a great success. It is exceedingly well written and admirably acted. Slight though the plot may be, the interest is unflaggingly maintained, and, as a literary production, it is entitled to very high praise. The third act especially is a masterly piece of construction. It falls especially within our province to note that all the troubles of the hero, *Cyril*, very well played by a new man, Mr. Vernon, result from his attending a supper given to present a testimonial to one *Lincher*, who has submitted a design for baths and washhouses, and failed to convince the committee that his design ought to be accepted. "Why are we giving him a testimonial?" replies *Matthew Pincher*, a literary hack, capitally presented by Mr. John Clarke; "why, because he has done nothing to deserve it." Mr. David Fisher, Mrs. Stephens, and Miss Henrade are other known performers who have parts, and contribute to the unmistakable success of the piece. Amongst those not known before is Miss Maggie Brennan, the representative of the *Hon. Fred. Titeboy*, a youngster of fashion, with more heart than head. The self-possession without impudence, the naturalness without mawkishness, and the humour without vulgarity displayed by this young lady won for her a reputation in a night. But why Maggie? The designations now assumed by our young actresses are one of the bad signs of the times. We have Miss Milly this, Miss Polly that, Miss Nelly one thing and Miss Patty the other. Those of them who wish to maintain the dignity of their art and their own self-respect will give up this slang and endeavour to stand before the public like ladies.

As we are talking of things theatrical, we may add one or two notes which serve to show the movement just now going on in that direction. The Gaiety, on the site of the Strand Music Hall, is being proceeded with rapidly, and will be opened some time in the present month. Looking at the present bare walls, this would seem scarcely possible to those not used to theatre-building. The fact is, however, that the whole of the interior is in course of completion elsewhere, and will be at once put into its place when the shell is ready to receive it. This theatre will have the peculiarity of being Gothic in style! The St. James's Theatre, we understand, has been bought by Mrs. Wood, the American actress, and will be pulled down, together with some of the houses in the adjoining court, with a view to entire reconstruction and improvement. This, however, will not be done yet, a French lady having taken the theatre for the next eight months, intending to produce drama and extravaganza. Moreover, Brompton, rumour says, is to have a theatre. The story is, and we have reason to believe it correct, that a popular novelist, who has taught the public it is never too late to mend, has purchased two of the houses in Brompton-row, not far from Brompton-square, and on the site, which extends backwards considerably, intends to build a playhouse at the end of next year.

* See p. 895.

THE REGULATION OF RAILWAYS ACT, 1868.

AMID the din of that personal squabble which we call Parliamentary legislation, and encouraged by our contempt for the old maxim "*Nolumus leges Angliæ mutari*;" measures of great importance will at times elude the exigencies of faction, and the comments of the daily press, and, to the surprise of every one, become law. It is probable that the most valuable of our legislative improvements are those which thus slip through Parliament, since any perceptible degree of homogeneity in a Bill is pretty certain to be destroyed by the process of lengthened debate. In fact, when a new statute issues from the senatorial mint, its value is, for the most part, altogether uncertain, until it has received the stamp of judicial exposition. Very frequently the ablest lawyers profess themselves unable to state what will be the effect of a new Act of Parliament, until a case arising under its provisions has been tried before a court of justice.

We have a striking instance of the manner in which laws may sneak into existence, in the Act of Parliament 31 & 32 Victoria, cap. cxix., called "An Act to amend the Law relating to Railways," which commences by enacting that "This Act may be cited as the Regulation of Railways Act, 1868." It received the royal assent on the 31st of July last, but we are not aware that public attention has hitherto been at all adequately directed to its important provisions. It will be seen that they are well worthy of that attention.

Commencing with the preliminary establishment of the "short title" above quoted, by which the Act may be cited, the new enactment goes on to fix, on the broadest and most comprehensive scale, the interpretation of the terms "railway," "company," and "person." It does not seem possible that any of the difficulties, lately discovered to attend the use of the latter word, can crop up in legal proceedings under the Regulation of Railways Act.

The new law then confronts the important question of accounts. It does so in a fearless and determined spirit, and, it must be admitted, with the promise of working an important and much-needed reform. Fifteen blank forms of account, and two forms of certificate, are included in the first schedule annexed to the Act; and every incorporated company is enjoined to prepare and print a statement of accounts and balance-sheet, together with the other statements and certificates required by the schedule, in correspondence to these forms, every half-

year. A penalty not exceeding five pounds per day is declared in case of default.

The enforcement of a uniform method of stating capital and revenue accounts is, in itself, an important step in the right direction. It will be a boon of no slight value to the *bonâ fide* investor; and will, to an equal extent, be a blow and discouragement to the share gambler.

The form of the accounts, moreover, is to a certain extent clear and lucid; but the schedule appears to have been drawn up without consulting an engineer, or some much-needed improvements would have been made in it. Thus in Form No. 5, "Details of Capital Expenditure for Half-year ending ——," the item of "Works" is omitted from what purports to be an exhaustive distribution of the expenditure of capital. The aim and intent of the form is clear, and the draughtsman no doubt thought that the expression "construction of way and stations" was calculated to elicit full information. If the accountants of the several companies desire to keep back any information which is not explicitly required, or even if they are officially exact, or nervously anxious to keep to the very letter of their newly-prescribed duty, this want of proper professional phraseology will give room for much regret. The miserable economy that saved a fee, which should have been given to some eminent engineer for revising the schedules, is likely to cost the country at least the expense of an amended or explanatory Act of Parliament, to say nothing of loss of time. The expenditure out of capital for the half-year is directed to be given, as showing, "under separate heads, amount paid for land (purchase and compensation); construction of way and stations, including rails, chairs, sleepers, &c.; engineering and surveying; law charges; Parliamentary expenses; interest, commission, &c." No such details are, however, insisted on in Form No. 4, "Receipts and Expenditure on Capital Account," so that the value of the detailed information demanded by the Act, even independently of the failure of the draughtsman to define properly what the framers of the schedule really wished to know, is reduced to a minimum.

To insure uniform, intelligible, and reliable accounts, that would be of real value at once to the profession and to the purchaser of railway stock, a very little enlightened care would have sufficed. An exactly similar demand for detailed account should have been inserted both in Form No. 4 and in Form No. 5. It should have been something to the following effect,—"Showing, under separate heads, the amounts actually paid for,—(1) parliamentary expenses; (2) purchase of land; (3) compensation to landowners and occupiers; (4) works, distinguishing earthwork, masonry, tunnels, and heavy viaducts; (5) permanent-way materials, distinguishing cost of (*a*) rails, (*b*) chairs, (*c*) bolts and fittings, (*d*) sleepers or timbers; (6) laying of permanent way; (7) stations, distinguishing passenger and goods; (8) law charges; (9) engineering and surveying; (10) finance charges; (11) any expenditure not included in the above."

Subject to that more matured consideration which should always precede, not follow, legislation, the adoption of some such form as that above sketched would have enabled any man familiar with railway construction to form a very accurate notion of the financial position of every company, on the face of each half-yearly account. Again, with regard to the working expenses. A little more precision would have had the same happy result. In the abstract of the cost of maintenance of way, there is a statement of "miles maintained, double—single." How much of this length is due to actual running distance, how much to sidings and station yards, is left out of sight. The actual running length of line should be clearly stated. If to this a table of gradients had been added, or at least a summary of such a table, and the tonnage of the coal and coke consumed had been stated, as well as the cost of those stores, the information would have been so complete as to be of extreme value. To know the sum spent in fuel, while remaining in ignorance either of the cost per ton, of the running lengths and gradients of the line, or of the mileage actually made by the trains, is to have the materials, indeed, for a partial and hasty comparison, but not those for a searching and useful criticism.

It is a matter much to be regretted that so well-intended an effort should have fallen so short of what might have been easily attained. Legislation has taken its course. Steps which we have ourselves pointed out as essential to the re-habilitation of railway property have been boldly taken, and yet the full amount of satisfaction that might have been readily obtained has been missed, for the mere reason that competent professional advice has not been taken as to the engineering details of the forms now made imperative by law.

The Act goes on to enforce the signing of the accounts of the company by the chairman or deputy-chairman, and by the accountant; and to provide penalties for the falsification of accounts. It gives power to the Board of Trade to appoint inspectors, to examine into the affairs of any company under certain conditions, or auditors to examine the accounts. Then follows the clause as to which a public dispute arose between Lord Redesdale and Sir E. Watkin as to the issue of preferred and deferred stock, a clause as to the admissibility of which there is much to be said on both sides. The liability of companies (including canal companies) as carriers is then defined. A legible table of fares is ordered to be exposed at every station; and certain provisions are made with the intent of securing fair treatment for steamboat passengers, and for the consignees of goods.

A clause as to proceedings in case of non-consumption of smoke is worded in a curiously unsatisfactory manner. It is intended, apparently, as a mere supplement to the provisions on this subject in the Railways Clauses Consolidation Act of 1845; but a clear and distinct enactment would have been preferable to a patch on the former law. The clause is to the effect that, where proceedings are taken against a company for failing to consume the smoke of the locomotives, the justices before whom the complaint is heard are to decide whether "the engine is constructed on the principle of consuming its own smoke, but that it failed to consume its own smoke as far as practicable at the time charged in the complaint through the default of the company or of any servant in the employment of the company." The clause does not provide for any professional assistance to their worships, the justices, in case of any complaint involving so nice a mechanical question; and a finer sample of legal engineering, or of the failure of legal draughtsmanship in an attempt to grapple with a practical mechanical question, it would not be easy to find.

The provision of smoking compartments in every passenger train where there are more carriages than one of each class, is made imperative after the 1st day of October, 1868. But no penalty is provided for the infraction of the provision, any more than for the failure to post a legible table of fares, or to furnish, on demand, particulars of charges for goods. A penalty of from 250*l.* to 500*l.* is declared in case of any special accommodation being given for prize fights. The difference between the reality of the legislation on a point that so rarely can arise, by the declaration of a large penalty, and the vague uncertainty in which the clauses affecting the comfort of so many passengers in the matter of fares, of goods, and charges, are left by the omission of any fine for the neglect of the new law, is worthy of comment.

The long-vexed question of a communication between passengers and the company's servants is set at rest, as far as enactment goes, by imposing a penalty of 10*l.* for each case of default in providing such a communication, after the 1st day of April, 1869. Five pounds fine is imposable on any passenger who makes use of such means of communication without reasonable and sufficient cause. There is not even an exception in favour of the day on which the new provision is to come into vigour—a very suggestive date.

Two very good clauses provide for punishment of trespassers, and for the removal of trees that may be in danger of obstructing the traffic.

The question of compensation for accidents is treated in a singularly inefficient manner. The Board of Trade is authorised to appoint an arbitrator to determine the amount of compensation, on a joint application from the company and the claimant. Where parties are so far agreed as to take such a step as this, it is easy to appoint an arbitrator without any further intervention. It is also provided that a judge may order examination of an injured claimant, by a medical man; but no such provision is made, as would have been consistent, in the case of the proposed arbitrator.

We have already spoken at such length on the subject of railway compensation, pointing out that the only satisfactory course is the adoption of a definite system of insurance by the companies, that we need merely now call attention to the inutility of the above-named clauses.

The fifth portion of the Act is, we cannot doubt, by far the most valuable and important. It provides, in three simple clauses, 27, 28, and 29, for the traffic of the future. On this point, also, our readers will be fully prepared for our opinion. The state of the law, up to the passing of this Act, has acted as a direct bar to the due and legitimate extension of the railway system of this country, by rendering it imperative that branch lines, even to the remotest country districts, should be adequate to the full strain that is thrown on the main trunk.

In the clauses authorising light railways may be traced the workmanship of a far more skilful hand than that which has allowed such lamentable slips as to statement of accounts and enforcement of penalties. The one necessary step has, in this instance, been taken; and no more. The barrier has been knocked down; and that with so well-proportioned a blow, that no casual reader of the Act of Parliament would be aware of the revolution which it is calculated to effect. It is simply enacted that "the Board of Trade may by licence authorise a company applying for it to construct and work, or to work, as a light railway, the whole or any part of a railway which the company has power to construct or work." Notice of such application is to be given, and objections are to be inquired into by the Board of Trade. The conditions and regulations subject to which the "light railway" shall be worked, are remitted to the wisdom of the Board of Trade; the two cardinal provisions being alone insisted on,—first, that no greater weight than eight tons shall be brought on the rails by any one pair of wheels; and secondly, that the speed shall in no case exceed twenty-five miles an hour.

This simple enactment removes the obstruction which the—we can hardly give any other word than—stupidity, of Parliament has hitherto opposed to the due extension of the railway system of this country. In a recent number* we made some remarks on this important subject. While the public highways of Great Britain, as is the case in every other part of the civilized world, have been fairly proportioned to the amount and character of the traffic which they were destined to serve, the railway engineer has hitherto been directly prevented by the Legislature from exercising the same wise economy. For city thoroughfares the roadway has required, and has received, a very different amount of care from that given in the case of a long line of mail-coach road. For the country lanes and by-ways, again, far less expenditure has been incurred than for the mail-coach lines. And thus has expenditure gradually been economised, down to the farmer's occupation road, or the grassy drive through the nobleman's park. But for railways, hitherto, the same outlay per mile has been legislatively imposed for the branch in a country district that may require a couple of trains per diem, and for the main trunk over which whirl the mail and express trains that connect London with the great centres of population at home and abroad. Single or double line is the Hobson's choice which we have hitherto had.

It is, happily, unnecessary now to argue as to the injurious stupidity of this legislation. But it is well to point out to all those interested in the industrial development of the country, or in the welfare of railway property, the great importance of the revolution which the Act of 1868 has so silently authorised. Our system of railways, costing, as we have before shown, nearly 35,000*l.* per mile for 14,000 miles which have been constructed in the United Kingdom, (the 9,634 miles in England alone having cost 42,000*l.* per mile), can now be completed by branches and feeders, constructed in accordance with the requirements of the districts, at a cost not exceeding a tenth part of the present extravagant outlay. That this low cost will in all cases be attained; that the reign of a wise economy will at once set in; that all idle waste will be henceforth carefully eschewed; in fact, that human nature will be favourably modified by Act of Parliament;—we are not so sanguine as to expect. But it is much, that waste should no longer be enforced by statute or by standing orders. It is much, that the "wisdom of the Legislature" has at length permitted engineers to apply the principles of economy and of common sense to their work. And we cannot doubt that all the industrial classes will have reason, before long, to rejoice in the permission thus snatched from the House of Commons.

The remainder of the forty-seven numbered paragraphs of the Act provide for arbitration in

* See p. 649, *ante*.

certain cases of dispute, for information as to shareholders' addresses, and for some other special details of little general interest. With all its faults, especially those of want of courage in dealing with the great sore of Parliamentary outlay, and want of professional acumen and experience in the draughting of portions of the Act and schedules, as before mentioned, the Regulation of Railways Act, 1868, is a boon to the people of England.

THE PROPOSED PUBLIC OFFICES.

PUBLIC OFFICES CONCENTRATION.

THE most important of the plans deposited at the private bill-office of the House of Commons up to Monday last, the last day for receiving plans in connexion with bills to be dealt with in the next session of Parliament, was probably that which embraces the property in Westminster to be appropriated by Government for the new Public Offices. There may have been notices given of bills involving more important engineering works, but no other coming bill gives promise of equally imposing architectural results; and, although some of the other proposed bills may affect, more or less, a large number of valuable properties, no other comes with such a fell swoop upon a large and definite area, proposed to be entirely cleared away. The plan referred to embraces the three blocks of building which have the common boundaries of Charles-street and Great George-street, and the outer boundaries of Parliament-street and St. James's Park, with King-street, Duke-street, and Delahay-street intersecting. The appropriation of this property seems to indicate that the public offices are designed to occupy two immense quadrangular blocks, extending from Parliament-street to the Park in one direction, and from Downing-street and the end of Whitehall to Great George-street in the other; Charles-street, running between Parliament-street and the Park, will be the inner boundary of each of the two quadrangles, and will exhibit the splendour of their side fronts. The partial breaking up of the head-quarters of the engineering profession in Great George-street, and the dispersion of the Parliamentary agents in Parliament-street may cause regret, but the clearance of such other buildings as occupy the ground, and the substitution of the palatial structures destined to rise upon the site, can only be cause for public satisfaction. The fragmentary portion of the northern quadrangle now in progress will include the Home and the Colonial Offices, in addition to the India and the Foreign Offices, already occupied. The new quadrangle to the south will be required for the War Office, the Admiralty, and various other departments. It may be mentioned that the bill authorising these great works is of a hybrid character; in so far as private property has to be appropriated, the bill has to be dealt with as other private bills; but inasmuch as this bill is for State works, at the public cost, the Public Offices Concentration Bill will be dealt with as a public bill.

MOSAIC DECORATION.

ROYAL INSTITUTE OF BRITISH ARCHITECTS.

AT the ordinary general meeting of the Institute held on Monday evening last, Mr. Charles Barry, V.P., in the chair, an interesting paper was read by Mr. A. H. Layard, M.P. (Honorary Fellow), "On Mosaic Decoration."

Mr. Layard said,—I desire to call your attention this evening to a subject of some interest both to the architect and the public—Mosaic Decoration. It has already been treated, and very ably treated, as everything he takes up is very certain to be, by my friend Mr. Digby Wyatt, in a paper read before this Institute on the 17th of March, 1862. He dealt with the subject as a member of the profession. I can only do so as an amateur without much practical experience; but since he read his paper, much has been done in mosaic, and in the direction which he then pointed out. I trust, therefore, I may add a little to the information furnished to the Institute by him.

I have long turned my attention to the subject of architectural decoration, external and internal. It has been connected in my mind with two great objects—public instruction and public enjoyment. In public instruction I would include all that is calculated to raise the character, cultivate the understanding, and refine the taste, as well as to impart actual knowledge. By public enjoyment, I mean that exquisite sensation of delight and satisfaction which arises from the contemplation of the beautiful, and that pleasurable effect which, although difficult to define, and very often almost imperceptible, is produced by beauty of form, proportion, and colour upon most men.

With a desire, then, to ascertain how these two objects could be best promoted in this country, I have studied, as well as my opportunities would permit me, the architectural decoration, external and internal, as employed by the ancients and the moderns in different parts of the world, in the West and in the East, but especially in Italy, which now affords us the best school for the investigation of this subject; but to go into the general question at any length, would be to occupy your time far beyond the usual limits. I shall, therefore, confine myself to only one branch of it, viz., the decoration of public buildings, religious and secular, in this country, and the materials which may be best employed for such decoration.

It has always seemed to me that the numerous public buildings which have been erected during the last few years, and which are now in course of erection, or in contemplation, in England, and especially in the metropolis, would afford an unexampled opportunity for educating the public mind, and improving and elevating the public taste, through the means of mural decoration.

Mr. Ruskin, with his usual eloquence, and just appreciation of the real value of art, has observed that the Church of St. Mark, at Venice, was "to be regarded less as a temple wherein to pray, than as itself a Book of Common Prayers, a vast illuminated missal, written, within and without, in letters of enamel and gold. The common people were taught their Scripture history by means of the mosaics, more impressively perhaps, though far less fully than ours are now by Scripture reading. The walls of this church became the poor man's Bible, and a picture more easily read upon the walls than a chapter." "Never," he exclaims, "had a city a more glorious Bible!" and at every hour of the day, he might have added, the book is open. Our own churches might afford, and, perhaps, once did afford, public instruction of a similar kind, and at the same time become beautiful and solemn monuments like St. Mark's. Our public buildings might do for our history, political and intellectual, what our churches might do for our religion. There have hitherto been two difficulties in the way—English prejudice and English climate: the first chiefly affects our churches, the other both our churches and public buildings. As regards English prejudice, there is much yet to get over, although a great deal has been effected in the right direction. I do not intend to enter into the reasons for this prejudice, or to seek to combat it. Suffice it to say, that the strong reactionary feeling against the influence of the church of Rome, which set in at the time of the Reformation, and which received additional impetus during the Commonwealth, is yet powerful among us; and that church decoration is still connected, in the imagination of a vast number of people, with the tenets of the Roman Catholic faith. But I will presume that this prejudice has now greatly subsided, and that we are at liberty to decorate our churches to our heart's content, so long as we do not introduce into them any figures or symbols which may scare good Protestants, without our orthodoxy being called into question.

With respect to our public buildings, there is no such prejudice existing, although there is still floating about, even amongst educated people, who ought to know better, that strange notion that decoration is un-English, unsuited to our climate, and vulgar. A step in the right direction, though, unfortunately, owing to various circumstances, not a very successful one, has been made in the ornamentation of the Houses of Parliament. Had that attempt been more successful, the example would, I doubt not, have been more extensively followed in this country than it has been.

The climate difficulty is really the one which stands in our way, and which we must seek to get over. Owing to it, the attempt made on the Houses of Parliament has been unfortunately arrested, and a great work which might have added to our national glory, has been left unfinished. If the difficulty can be removed, I believe that, with the general improvement in public taste, and with the desire for educating the people, which now prevails, we may see our churches and our national edifices covered with mural decoration, which would serve to cultivate, refine, and instruct the masses.

For some years I entertained a hope that wall-painting, either buon-fresco, fresco-secco, or water-glass, might be adopted in this country. I had carefully examined, and, indeed, partly traced, almost every wall-painting in Italy. I had convinced myself that, except, perhaps, at Venice, fresco would resist the effects of climate and of time, when only protected against them with moderate care. The frescoes of Giotto in the Arena chapel and at Assisi, in fresco-secco, be it remembered, are almost as fresh and transparent as when he painted them, except where exposed to wilful injury, or, as I regret to say they still are, to the grossest neglect. The frescoes of Ghirlandajo and the great masters of his time, are only blackened by the smoke of candles and incense, or by dust and dirt never removed. The beautiful decorations of the library of the Cathedral of Sienna are as bright as the day on which Pinturichio finished them. The frescoes of Pordenone in the church of St. Maria della Campagna at Piacenza have almost acquired the consistency of enamel, and would seem to be indestructible. In Venice only, owing, it is alleged, to the extreme moisture and saltness of the sea air, wall-painting seems to have partly failed. Of the great works of Giorgione, Titian, and other masters of the Venetian school, which once embellished the palaces of that city, and of those of Pordenone which adorned the cloisters of St. Stefano, only fragments now remain. But these frescoes, it must be observed, were on the exteriors of buildings, and therefore completely exposed to the effect of the atmosphere. Tiepola's frescoes, in the Lobbia Palace, and in some churches, do not appear to have yet suffered; but still it would seem that the Venetians distrusted the durability of fresco, and never employed it on a large scale, even for internal decoration, when it was being so used in almost every other city in Italy.

With the examples of fresco painting which I have mentioned, and with my desire that mural decoration on a large scale should be introduced into this country, I was rejoiced to see that which was being done under the direction of the Fine-Art Commission, of which the Prince Consort was president. I lost no opportunity of advocating, publicly and privately, fresco decoration. Amongst those who took the same view of the subject as myself was my distinguished friend, Mr. Watts; but he did more than I could ever hope to do in the cause; and with a devotion to his art and the public spirit, which are the best accompaniments of genius, he undertook to execute, without remuneration, a vast fresco on the walls of the hall of Lincoln's Inn. That work, criticise it as you like, is the greatest of its class on this side of the Alps; and I cannot believe that any man of feeling can be insensible to its grand and solemn character, or any man of taste to the additional value and majesty it gives to the architecture. Unfortunately, Mr. Watts has never completed the decoration of the hall; all the empty spaces in which should be treated in connexion with the fresco forming the principal feature in it. I do not think that we are yet sufficiently impressed with the fact, that in decoration completeness and general harmony are essential; and that, without these, the true and full effect of a great fresco, or any other similar work, can never be properly appreciated.

My hopes with regard to fresco were doomed to disappointment. I have no reason to believe that any serious deterioration is taking place in Mr. Watts's fresco at Lincoln's Inn; but in the Houses of Parliament, some of the frescoes had scarcely been painted before decay commenced, and many of them are even already almost gone. The same thing has taken place with the late Mr. Dyce's frescoes in All Souls' Church, in St. Margaret-street, which, I am informed, have required almost entire repainting. I was at one time inclined to assign this rapid decay to some defects in the materials employed, either in the pigments or the intonaco, or lime, especially as the same deterioration had occurred in some of the frescoes at Munich, though by no means in all; it will appear where, at least, the fault could not be laid upon the English climate. The Germans, however, attributed it to the effects of the atmosphere acting upon the exterior surface of the painting, and to prevent this they adopted the method of covering the fresco with a solution of silicate called waterglass, which was supposed

to be impervious to the air. The great frescoes of Kaulbach at Berlin have been painted in this material; and Mr. Maclise and Mr. Herbert have adopted the process in their most recent works in the Houses of Parliament. It is, perhaps, too early to pronounce decidedly upon the durability of the waterglass, but there are grounds for fearing that it will not resist the insidious attacks of our London smoke. Dr. Percy, after a very careful scientific examination and analysis, carried on under official instruction, has come to the conclusion that no such painting, whether executed in buon-fresco or fresco-secco, can resist the atmosphere impregnated as that of London is with the chemical substances evolved from the consumption of coal. He doubts even the efficacy of waterglass, and gives it as his opinion that Mr. Herbert's well-known fresco will not be safe except under glass. The scientific investigations of Dr. Percy have, unfortunately, been confirmed by the practical experience of Mr. Digby Wyatt.

I confess to great disappointment at this unexpected result of the attempt to introduce fresco painting into England. It is a noble art, the one declared by Michelangelo to be best fitted to show the genius of a man; the one which gives the really great painter the widest influence over, and can bring him into the closet communion with, the great mass of his fellow men. It can raise the great painter to the level of the great poet. Think one moment of the fame which Leonardo da Vinci, Michelangelo, and Raffaelle have achieved through their wall paintings. Leonardo's "Last Supper" is more widely known than any poem that was ever written, not excepting the "Iliad." Throughout the whole civilised world some kind of copy of this immortal wall painting may be found in the palace and the cottage. But after what has occurred I am afraid that we must give up the hope of seeing fresco painting introduced on any considerable scale into England.

Thus disappointed, I turned my attention to mosaic as a means of supplying the place of fresco. With this object in view, I have carefully studied most of the finest examples of mosaic decoration in Italy. It is unnecessary for me to enter into the history of mosaic: that has been done already by Mr. Digby Wyatt in his paper to which I have already referred. It is sufficient now to say that the art of putting together small cubes or tesseræ, as they are technically called, of different substances, so as to form patterns and figures either in monochrome or in various colours, is one of very ancient date, and was known even to the earliest civilized nations,—such as the Egyptians, Assyrians, and Babylonians. Mosaic was applied to the decoration of walls and pavements, and was extensively used, especially for the latter purpose, by the Greeks and Romans in their public and private buildings. Owing to the durability of the materials generally employed,—such as hard marbles and porphyries, enamels, or glass and terra-cotta,—mosaic has defied the ravages of time probably more effectively than any other architectural decoration. To this day the remains of mosaic pavements are the most usual indications of Roman sites in England and in many countries of Europe, as well as in parts of Asia and Africa. But pictorial mosaic on a really large scale was first used for the decoration of public buildings during the later days of the Roman empire, and during the supremacy of Byzantium, and in those countries which derived their civilization and arts from Rome and her Eastern successor. It took its chief development after the spread of Christianity, and in the decoration of Christian edifices, so that we may call it essentially a Christian art. The most magnificent examples of ancient times were to be found in the churches of Christian Rome, Constantinople, and Ravenna. It is to this Christian mosaic that I wish now to draw your attention.

The chief features, then, of this Christian mosaic are the vast extent of wall-surface to which it was applied; its most frequent use on domes, apses, and curved surfaces; and the representation of figures and ornaments on a gold ground, although a gold ground was not always used, as in the early mosaics in St. Pudenziana and St. Prassedo, and in the baptistery of St. Giovanni Laterano, in Rome. In Italy to this mosaic the epithet Byzantine is indiscriminately though wrongly applied. It is true that the art flourished in the East when it had almost died away in the West, and that Italy owes to a great extent to Byzantine artists its revival; but a direct Roman influence, as Mr. Digby Wyatt has well pointed out, may be traced in Italian mosaics up to the eighth and even ninth century. The art, however, flourished contemporaneously in the eastern and the western parts of the empire.

The extreme richness of their mode of decoration and, at the same time, its grand and solemn character when used in large masses, made it especially applicable to religious purposes; and it appears to have been generally used for the embellishment of churches, although there are several recorded instances of royal palaces having been very profusely adorned with it. A vast mass of ancient mosaic work has perished: no small amount in the East is still covered with whitewash and plaster. There scarcely seems to have been a church or baptistery of any importance built within the precincts of the Byzantine empire that had not more or less mosaic decoration. The fashion spread across the Alps, and we find Charlemagne decorating his basilicas and palaces with mosaic.

This general use of mosaic led to improvements in the materials employed. Marbles and porphyries could no longer be exclusively used, and earthenware did not promise the required durability. Enamels or vitreous substances, which the Italians call "*smalti*," and which had not been unknown in earlier times, were mixed with them. The art, too, of enclosing gold-leaf within layers of glass, a very difficult one, and requiring great nicety of manipulation, was also discovered (there is no evidence, I believe, that it was known in Classic times); and thus the gold ground, one of the peculiar features of this mosaic, could be effectively executed. Of these early mosaics, the most remarkable now preserved are those of St. Sophia, a church at Salonica, the baptistery of Constantine, or St. Costanza, at Rome, which show a curious mixture of Pagan and Christian figures and symbols, and the style of which almost approaches that of the painted ornaments in the Baths of Titus; of the apse of St. Pudenziana, also of the fourth century; of the monumental chapel of Galla Placidia, and of the baptistery of Ravenna, and of St. Maria Maggiore at Rome, of the fifth century; and those of St. Vitale, of St. Apollonaris in Classe, and of St. Apollison Nuovo in Navarre, of the sixth century. Unfortunately few of the early mosaics at Rome and even Ravenna are free from considerable restoration, and their original character is in many instances much destroyed: frequently these restorations are even made with coloured plaster.

I will now direct your attention to those edifices which furnish the best examples of mosaic decoration and are most deserving of study, with a view to the use of mosaic in this country. I exclude St. Sophia because the mosaics on its walls are for the most part concealed by plaster. In its original state it must have been, as far as the interior is concerned, one of the most glorious buildings that the world ever saw. In no other, probably, were such vast spaces covered with the richest mosaic decoration; and every part that was not so covered seems to have been panelled with the rarest and most beautiful marbles. I had the good fortune to see St. Sophia when under repair, and when the plaster had been removed, under the direction of an Italian architect, Sig. Fossati. The effect of this partial revival was truly magnificent. Some idea of the vastness and richness of the details may be obtained from Salzenberg's work, which is in your library. I would particularly dwell upon the extraordinary preservation of these mosaics. They had been covered since the Turkish conquest, and probably had not undergone much restoration in previous times. The examples, therefore, of mosaic, which I would most particularly point out for imitation, if the time should ever come, as I hope it will, when people in this country will be duly impressed with the value of internal decoration, are St. Mark's, Venice; Monreale and the Capella Reale, at Palermo; and the basilicas of Ravenna. I do not place these buildings in order of date, but according to importance as illustrating mosaic decoration.

St. Mark's, taken as a whole, is the most perfect example of internal decoration in the world. In other edifices you probably find instances of details and detached mosaics more beautiful than any in St. Mark's; but you will nowhere find an example of one grand and noble conception so thoroughly and completely carried out. It furnishes, too, the richest and most valuable chapter in the history of mosaic, for in this one building we have specimens of mosaics extending over a period between the eleventh, or certainly the beginning of the twelfth, and the end of the thirteenth century, and, consequently, comprising a variety of styles and showing many different modes of employing mosaic. Every square foot of the church, the baptistery and the vestibule, domes, apses, sides, and pavement, is covered with mosaic work, except where the richest marbles panel the lower parts of the walls. There is no uncovered or naked space. The eye, I may say the mind, is completely satisfied. Nothing looks as if it were unfinished, or as if there yet remained anything to be done. I cannot imagine any one to enter this glorious edifice without being deeply impressed with the solemnity and majesty, and, at the same time, with the exquisite beauty and harmony of all around him; without feeling that, if we are to have decorations in our sacred edifices on a large scale, and so as to add to their religious character, and at the same time to produce a sense of enjoyment of the purest description, mosaic is the most appropriate of all decoration. The lustrous surface of the enamels, the large masses of gold ground, the richness of the colour, produce an infinite variety of the most beautiful effects, ever changing as the sun changes its place. St. Mark's is never the same. Enter at any hour of the day, in summer or in winter, and whether the sky be clear or overcast, and you will ever be surprised and delighted by some new unexpected effect. In the morning, the recesses of the nave-end, the grand solitary figures of Christ, the Virgin, and the Evangelists, will be revealed to you. At midday, when the full light of a southern sky is equally diffused over the interior, the many domes and vaults are so illuminated that every detail in that vast maze of figures and ornament can be plainly detected. And when the rays of the setting sun stream through the western window upon the grand apse above the high altar the majestic form of the enthroned Saviour seems to float in a sea of burnished gold. Even when the shades of night are fast gathering over the lower parts of the building a mysterious and solemn light lingers for a time on the golden domes and vaults of the upper, like the bright clouds which float in the sky after a Venetian sunset.

The singular harmony, notwithstanding the abundant richness of the gold grounds, which prevails throughout the decoration of St. Mark's, is owing to its completeness. Any whitewash or plaster, or blank unredeemed space, such as one sees in our churches, would have been an eyesore, and would have marred the marvellous beauty of the whole. Decoration, when thus complete, whatever may be the wealth of gold and colour lavished upon it, is never vulgar or tawdry; but, on the contrary, when a just balance is preserved in them, it is sober and harmonious, and can be made eminently subservient to religious purposes. It is only when decoration is introduced as if it were something not forming an essential part of the building itself, but only put there for show, and as if too precious except to be doled out with a niggard hand, that it does become vulgar and tawdry, and appear inconsistent with the objects of a sacred edifice.

St. Mark's teaches us that it is especially necessary to avoid white spaces, and particularly plaster, where materials so rich as mosaics are employed. We see this well established in the sacristy. Its vaulted ceiling, lunettes, and spandrels furnish one of the most exquisite examples of cinque-cento mosaic work with which I am acquainted; but the effect of the whole chamber is greatly impaired, and an appearance of weakness and want of finish is given to it by a panelling of white marble, which runs completely round it, between the mosaic decoration and a skirting and benches of dark walnut wood below.

In St. Mark's we can study and satisfy ourselves as to the best mode of employing mosaics, and the style best suited to our churches, should mosaics be introduced into England. We have in this very museum of mosaic decoration specimens of all styles and manner of work. The most ancient are simple figures on a gold ground, probably the work of Greek artists; or if not, certainly copied from them, and properly termed Byzantine—such as the colossal figure of Christ seated on a throne, in the apse over the high altar; the figures of patriarchs, saints, and apostles in the domes, or the side walls of the nave, and on the pendentives; and the group of Christ, the Virgin, and St. John over the principal entrance. So, also, are some of the figures, arranged in processional order in various parts of the church, a tradition of the Classic period

of mosaic, as seen in the basilicas of St. Vitale and St. Apollonaire Nuovo at Ravenna. In the baptistery and vestibule, and in the semi-domed recess over the most northern entrance in the exterior, we have examples of the work and design of the thirteenth and fourteenth centuries. A more complete grouping of figures is attempted, and more variety in the tints. The tesseræ in some instances are very minute. The general design and arrangement of the figures are all strictly architectural. In the chapel of the Mascoli, one of the most beautiful portions of the church, in the wagon-shaped ceiling, decorated by Gianbono, towards the end of the fifteenth century, we see how the growing feeling for Classic ornament had modified the old manner, and had produced a style very appropriate to architectural decoration in mosaic. In the sacristy, in the works of Rizzi and Guccati, we have the graceful and flowing ornamentation, and the broad treatment of the draperies which mark the cinque-cento period; still, however, made subservient to the architecture, and forming part of it. Lastly, in the upper part of the walls to the left of the high altar, in the vaulting over the western end of the nave, and in the lunettes over the exterior entrances, and over the central entrance in the vestibule, the mosaics, having been executed from cartoons by Titian, Tintoretto, Salviati, and other great masters of the sixteenth and seventeenth centuries, we see how the mosaicist vied with the painter in producing pictures not only without reference to the architecture, but altogether independent of it. I will point out hereafter which of these different modes of treatment I consider best adapted to our modern buildings, and most consistent with the legitimate use of mosaic.

Perhaps the most perfect specimen of mosaic decoration after St. Mark's with which I am acquainted is that of the Capella Reale, or, as it is frequently called, the Capella Palatina, in Palermo. The chapel was built in 1132, and the mosaics were finished in 1143, or soon after. Consequently, they are all of the same period, although the original character of many of them has been somewhat altered by modern restorations. I place this interior next in order after St. Mark's, because, although much inferior in size to other buildings similarly decorated, the decoration is complete, leaving nothing to be desired It forms one beautiful and harmonious whole, without a spot upon which the eye can dwell with regret. It also possesses that solemn, religious character, and shows that infinite variety of effects which form the glory of the Venetian temple. The cupola, the sanctuary, the walls, and the aisles and nave are covered with mosaics, in which the figures of Christ and the apostles, and scenes from the lives of St. Peter and St. Paul, form the principal subjects. Beneath the mosaics is a skirting of rare marble. the pavement is of mosaic work (*opus Alexandrinum*) of serpentine porphyry and hard marbles.*

* To be continued.

HISTORICAL NOTES ON THE CULTIVATION AND TENURE OF LAND.

THE INSTITUTION OF SURVEYORS.

AT the ordinary general meeting held on Monday, the 23rd ult., the president, Mr. John Clutton, in the chair, several new members were proposed for ballot. Various donations of books and subscriptions to the library fund, amounting to about 115*l.*, were announced.

An interesting paper, entitled "Historical Notes," was read by Mr. Edmund James Smith, member, in which he noticed many of the scattered details relative to agriculture and transactions with property which present themselves in ancient history and in England prior to the commencement of the era of modern cultivation. He said the characteristic of the present system is the cultivation of the land by freeholders or by tenant farmers with free labourers, while that of the period prior to Henry VII. was that field work was the task of slaves or serfs. The oldest form of civilization was in Egypt, and its characteristic was repose. Corn was grown in Egypt as far back as history or tradition can carry us. The fecundity of the land was renewed yearly by inundations of the Nile, and the land was irrigated much in the same way as our water meadows. The art of mensuration must have been one of the earliest arts, as the boundaries were sometimes washed away, and required annual resettlement. He described the ancient mode of cultivation in Egypt, which was carried on with little valuation to the present day. The cultivation of corn in India more resembled that of the open field land system of England. In Egypt no manure was wanted; in India none was available, as all animal excrement was required for fuel. The later Greeks never cared for farming, but their pastures were excellent and their honey famous, and they were great bee-masters. The Romans in early days were fond of agricultural pursuits, but, as their power increased, they depended on Sicily, Egypt, and Africa for their corn, and there was always a large quantity stored at home to provide against the contingency of unfavourable winds stopping the importation. Three Greek and three Roman agriculturists have left prose accounts of farming. The alternate fallow, the insufficient working of the land, the few cattle kept, and the practice of burning the straw, show that the produce of a given area must have been insignificant, and demonstrate the great inferiority of ancient farming.

The notices of the value of property throughout this period are rare. The transfer of one parcel of land 4,000 years since proves that some land was then private property. He referred to the purchase by Abraham of the field and cave of Macphelah; and it was worth while to note the manner in which this ancient purchase was effected. The purchaser desired to buy a cave: the vendor begs he will accept it as a gift, but intimates that the field leading to the cave must be purchased. The purchaser declines the gift, and asks that a price may be named. The vendor names the price (about 50*l.*), and the offer is accepted by Abraham like a prince without discussion. The plot was probably about an acre of land, with olive trees some half a mile from Hebron; but we have no measure of the relative value of silver at that date. He knew of no other detail of the value of land in Judea until the grandsons of St. Jude were charged with treason before the Roman Prætor. They appeal to their horny hands, hardened with the cultivation of 24 acres of freehold on which they lived, and this is valued in the Roman census at 300*l.* of our money. Crassus, the wealthiest Roman, derived his riches from land immediately around the old city, the value of which will be apparent to surveyors from the fact that the emperors repeatedly enacted that no private house should be erected more than 70 ft. in height; and that when Rome reached its maximum it contained only 50,000 houses, but a population of 1,000,000, or twenty to each house, there being in our own most densely populated parishes only twelve persons to each house.

The residence of Crassus sold, after his death, for 30,000*l.*; another house sold for 130,000*l.*; and another, with its furniture and ornaments, being burnt, the loss was estimated at 800,000*l.* Marius gave 2,500*l.* for the site on which he built his villa at Misenum; and it was sold, after his death, for 80,000*l.*, his villa being built, probably, meanwhile.

The Roman census was much more complete than ours, and gave detailed particulars of all the property, as well as the names of all persons in the family. It was the duty of the College of Agrimensores (or Institution of Roman Surveyors) to measure and value every estate, so that it might be fairly charged with the public imposts. Their mode of surveying was primitive; they ran a line due south from a given point, and then ran another east and west perpendicular to it, and by a system of squares ascertained the relative position of fences and the area.

The College of Agrimensores no doubt originated in the same necessity which has induced us to form the Institution—the necessity for a more systematic practice on our part, and for some security to the State on its part, that business of the magnitude and of the confidential character entrusted to the Agrimentores should be properly transacted. We find corn was cultivated in this island before Cæsar's first invasion; and when Cæsar landed on the 25th of August, the corn was just beginning to be cut; but before he sailed away, on the 12th of September, the harvest was secured and the ships re-victualled. And at a subsequent period 600 Roman or Gallic ships carried from England some 126,000 quarters of corn, at a time of dearth in Gaul: this quantity could hardly have been raised from less than 60,000 acres.

In the succeeding 450 years the Roman modes of agricultural cultivation, as well as Roman civilisation, overspread the whole country; for the Romans followed here their general practice of imposing on the natives of each district an annual tribute of corn to be paid in kind. This tribute in kind at once provided for the food of their soldiers, and gave some security for the natives' good behaviour: the first sign of an impending insurrection was that the natives neglected to prepare the land for the next year's corn.

The withdrawal of the Romans 450 years after the landing of Cæsar, was the commencement of a period of relapse into barbarism, so complete, that the light of Christianity was totally extinguished south of the Humber, and only rekindled from Rome after a period of 200 years. The laws of the Anglo-Saxons regulate the prices of all kinds of cattle, and are nearly silent with respect to arable cultivation. The lord's mansion and demesne were under the care of the bailiff and domestic slaves, and the rest was held by bondsmen at rents fixed by law, but burdened with oppressive services to the lord.

There must have been some approximation to a survey of the Saxon kingdom about the year 1,000, nearly 100 years before "Doomsday Book;" for the Dane-geld, a tax of 1*s.* on each hide of land, was then imposed, and the "Doomsday Book" throughout compares the valuation and number of hides charged in the time of Edward the Confessor with the valuation and number then accounted for, and with the rents then actually paid for them.

The Anglo-Saxon transactions furnish us also with glimpses of prices. Thus, a hen was 1½*d.*, a sheep (of which the value of the fleece was two-fifths) was worth 1*s.*, a cow was worth four sheep, and an ox worth six sheep; a horse worth about five oxen, and a mare about three oxen. One hide of land was sold, the price of which is recorded at 118*s.* It is impossible to avoid perceiving that the gradual restoration of peace in England was mainly due to the monks and churchmen, whose monasteries and churches contained the only civilized men in the whole kingdom. Neither security nor knowledge was to be found elsewhere. The monks reclaimed the wastes, tilled the land, preserved libraries, taught the people, and inculcated Christianity.

The exertions of the monks were repaid by grants of land; and, as the boundaries of the townships and parishes had been by that time settled, there is little difficulty in identifying these several donations, except where they became lay property at the Reformation. The possessions of the ecclesiastical corporations and of the universities being the most ancient in the kingdom, and having been held uninterruptedly for eight centuries, afford the best chance of tracing the gradual increase of rents and change in the value of money consecutively through the whole period. It is remarkable that there is no notice of tithes in Doomsday Book, while the landed possessions of the bishops and abbots are carefully enumerated.

Doomsday Book was formed after the Norman Conquest, from evidence given to five justices in each county.

The county reports give the names of the landowners, and the extent, with more or less detail, of their lands. The landowners' names are frequently arranged in the order of their rank, but in some cases the return is arranged in the order of the parishes.

It would be supposed that from such a survey, so well preserved to us, a tolerably accurate account of the state of the country might be prepared; but to the present time no one has been able to deduce from it any practical results, except as regards population. The leading feature is the enumeration in each manor of the number of hides in some counties, of carucates in all counties; but what is a hide and what is a carucate is not settled.

Admirable facsimiles of the Doomsday Book of each county have recently been photozincographed and published at a nominal cost, but the letterpress prefixed to them is very unsatisfactory.

The hide has been variously estimated as 120 acres, as 24 carucates, as 14½ carucates, as 12 carucates, and as 6 carucates. In Hertfordshire each possession is stated in hides and virgates. The latter has been variously estimated at 30, 24, and 15 acres. The carucate appears in nearly all the surveys, as does occasionally the oxgang as a portion of the carucate.

Remembering that different justices took the evidence in each county, that the evidence was that of the grieve and tenants, and that these men spoke according to their local usage, no com-

parison between different counties seems to be possible. We are all aware that to this day the Irish acre, the Cheshire acre, the Lancashire acre, and the forest acre perplex our minds; and it is only reasonable to suppose that different standards of measure obtained in different counties; but within each county it might be possible to arrive at some nearly approximate standard, and he recommended the subject to the notice of the members. With respect to value, the same want of uniformity between the several parts appears; as, for instance, taking three estates following each other consecutively. In one 20l., in King Edward's time, had decreased to 14l. at the time of the survey; in another the value was unaltered; and in the third 16s. had decreased to 5s., about the time of the Conquest, and again risen to 10s. The one thing in which the Doomsday Book is probably to be depended upon, is in the number of men in each manor. The king would care more for this part of the account than even for increased taxation; and there would be more danger and difficulty in giving false information on this point than in diminishing the extent and the value of the lands in the manor.

The Doomsday Book did not extend to the county of Durham; but about 100 years later, an account of the lands within that county palatine was taken, but excluding the estates of the free tenants of the county. It relates the state of each parish, and is much more precise than Doomsday Book. Taking Bolton parish for an example, there were 22 villans, holding one with another 2 oxgangs of 15 acres each, or 660 acres together, each villan paying a rent of 2s. 6d. yearly, and 16d. in another form, and half a bushel of oats, and 5 cartloads of wood, and 2 fowls, and 10 eggs; and they gave 3 days' work in each week to the lord, all the year round, except Easter and Whitsun week, and for two weeks at Christmas, besides other heavy duties. And the 12 cottagers, each of whom held 12 acres, or 164 acres together, gave 2 days in the week work to the lord, all the year round, except at the festival weeks, and paid 12 fowls and 60 eggs each.

About 200 years after this survey another was made, including the estates omitted in the Boldon Book, and this giving a complete view at that date. The free tenants had 266 acres, and were 27 in number; one who received the bishop's rents in Weremouth, and was in fact his local agent, and had 36 acres without charge, and 26 who paid 34s. 8d. for each 10 acres, or about 3s. 6d. an acre. The 32 bond tenants now paid for 22 houses, and 46 oxgangs, with the mill and common rights, 44l. The day work appears to have closed, and the rent gone up to about 20s. an oxgang of 15 acres. It is not unlikely that the survey marks the time of the substitution of rent for servile work, which first took place on church lands.

In these two hundred years a considerable proportion of the demesne lands, and probably of the other lands, were gradually converted into arable land; and there is every reason to believe that the numbers of the population had largely increased. From the accession of Edward I., in 1272, to the death of Henry V., in 1422, a period of one hundred and fifty years, there had been continued internal peace and security; and he believed that a close investigation would prove that the cultivation was as far advanced and the population at least as large, if not larger, at that date than it was at the accession of Henry VII., more than sixty years later; for, in the meantime, the wars of the Roses destroyed nearly all the ancient nobility, and the peace and security of nearly every landed estate in the kingdom. The landholders having led their followers into the field, the numbers that returned were so diminished that the demesne lands were for the most part laid down in pasturage,—and, probably, much of the other land,—and, as the surrounding lands were arable, pasturage now involved the inclosure of the pasture closes. From the reign of Henry VII., the commencement of free labour generally, any connected account of English agriculture should begin. To that date the accounts of the operations of husbandry, and even the farming accounts, were written in Latin; but, from the beginning of the reign of Henry VIII., there are a series of regular treatises, written for the most part by persons actually experienced in the subject they describe.

It would appear that, from Cæsar's first expedition to the present time, a period of 1,900 years, one-fourth passed in comparative peace under the Roman dominion; one-fourth, reaching nearly to the Conquest, was marked by constant internal war and rapine; one-fourth, after the Conquest, was freed from external attack, but was frequently disturbed by internal strife; and that the last fourth alone is a continual and uninterrupted progress in civilization. No taxation can possibly bear comparison with the cost of internal disturbance, as regards agriculture,—to say nothing of trade, manufactures, and commerce.

At the reign of Henry VII., therefore, where modern history begins, he concluded, hoping that his cursory notice would induce others to continue the subject, and occupy the attention of members with papers of a more practical character.

A discussion ensued, in which Messrs. Huskinson, Clark, Vigers, Woolley, Buckland, and others, took part, and it was thought that the line of inquiry opened up by Mr. Smith was of great interest and usefulness, especially at the present time, when the tenure of land both by owners and occupiers, and the adjustment of their respective rights had become an important question in Ireland, and in England some modification of existing law and custom would doubtless be necessary; and it was suggested that by discussion among surveyors, who were so well acquainted with the several usages and varieties of tenure, and their effect on the value and disposition of property, some plan might be sketched out for assimilating custom and more strictly defining the interests of owners and occupiers, and so be of great assistance to the Legislature in maturing any scheme which it might be thought desirable to bring forward for that purpose.

Mr. F. J. Clark, who had visited Egypt, pointed out several peculiarities in the cultivation of that country which had struck him, and promised, if possible, to relate his experiences more at large in a paper on a future occasion.

The president mentioned several curious customs which had come within his own experience,—among others, that which obtains to the present day in the Isle of Portland, of taking a conveyance of land by paying over the money at the church-door, and of keeping the account of the Queen's Manor rents there on a stick with a series of notches. All custom was antiquated, and should be abolished. Every agreement should be expressed in writing; and he hoped the country members would take up the subject and bring it before the Institution for regular discussion.

A vote of thanks was given to Mr. Smith, and the meeting then adjourned to Monday, December 7th, when a paper will be read, entitled, "The Education of the Surveyor," by Mr. William Sturge.

OF SOME WELL-BUILT MONUMENTS.

The *Builder* often treats of monuments, either because of some going to decay before the fame of the things we mean them to commemorate, or of others puzzling us by surviving all memory of what on earth they meant,—for architects have not exactly hit the mark of making both monument and meaning endure as long as they are wanted.

Now the last year or two has uncovered a marvellous monument, so contrived by a consummate architect as to defy probably human power to destroy, deface, or make illegible, for as long as he meant the memory of what it celebrates to endure.

Most have heard of, and many (luckier than the present writer) saw the "meteor-stream" of the 14th of November, 1866; and that an American professor, Newton, predicted it, by deducing from numerous records, Chinese, Arab, and monkish, of star-showers in the last 900 years, that after every 33 years, two or three may be expected at intervals of 365 days 6¼ hours (that is, a siderial year and 21 minutes, or a tropical year and 41 minutes), or when we pass a certain point of the earth's path, but a point shifting onward so as to be reached nearly 24 hours later in each 33 years. Some may have turned a globe to see how the visibility of the shower in any land depends on its arrival between that country's midnight and sunrise; for we and they meet almost directly, as opposite trains, and before midnight we are always on our planet's sheltered back. Only from midnight to noon are we on her front, where their impact is possible, and most so at sunrise; near which hour only can a place meet them (as some in America did in 1833) like a *rain*, slanting but moderately from the south, owing to the perspective radiant point,—which keeps its place among the stars of Leo,—being only then on the meridian.

Now as to their orbit, each meteor might come to the place or "node" of our encounter either 67 times in the 33 years period, or 65, or 34, or 32 times, or only once: these were the five possible theories. In the two small orbits that would bring them round every 180 or 186 days, we should meet them at their farthest from the sun, therefore lowest speed, which, though added to our own (of 18 miles per second the opposite way) would scarce account for half the observed rate of meeting between our air and them. They would also be as frequently met in the 17th year as in the year or two after the 33rd. The two nearly circular orbits (of a 33rd less and a 33rd more than a year) would give them only our speed, or we should meet only at about 35 miles a second, instead of nearly 50, as we do. And our great discoverer of Neptune has found, by immense labour, that the action of the planets would not shift the node, in any of these four orbits, by the minutes that give the delay of three days per century. This can only be in the immense orbit that carries them out on a 33 years' journey, or beyond far-wandering dim Uranus; and only in this, which brings them to us at their nearest to the sun, and swiftest, is our enormous rate of encounter explained.

This rate is 100 times that of the best rifle-shot. Were it only 10 times, they would be a murderous hail; but because it is 100 times, they fail to reach us! None, seemingly, have mass enough to stand the air's friction three seconds, but are dissipated into flame and vapour. Each pebble cleaves the thin fluid, from 70 miles down to 40 miles above us, dragging after it a vacuous globe, as big perhaps as a house, filmed over with intensest fire; but into this and the smoke-train, the whole solid, be it salt or adamant, has been resolved ere it can, in the slant direction they commonly arrive, be retarded enough to drop perceptibly from the straight line!

Now the last-found marvellous property of light came just in time to reveal something of their materials. With the spectroscope, Mr. Browning caught the rays of some in the 1866 display, and found diversely proportioned mixtures of light from solid and from gaseous matter, but in all a dominant yellow, as of a soda-salt vaporised, except in two that gave green rays, apparently magnesian.

Next came Schiaparelli's discovery, from the table of comets, that this and the other known meteor-streams are following in the exact wake of every little comet known to have crossed our annual path in space. For the orbits of many,—though only telescopic ones,—do actually cut or touch that of our earth. The small comet which heads this November train had been only observed by Europeans within the same year. In January, 1866, this Tempel's comet passed, with the very direction and speed of the meteors, the point that we pass on November the 14th. Ten months after him, we arrived there, and found his retinue still passing, in thousands per minute; and after another *year*, and even *another*, up to this third November, their procession has not entirely passed!

It is not in the power of observers, from the mere ellipticity of so much of a comet's orbit as it traverses in one appearance, to approximate more than vaguely the period of its revolution. The calculator of this one's elements, however, Dr. Oppolzer, actually fixed as the likeliest period, a fraction over 33 years. His finding thus any length between 30 and 40 would have been remarkable. The comet has since been identified with one observed by the Chinese, passing its descending node, in August, 1366 (but two months before one of the chief recorded meteor showers), and these Chinese observations had been reduced to elements twenty years ago. There is no manner of doubt that between the Chinese date and the visit in 1866, this cometule made 15 exact nodal revolutions. Thus, then, by most rare coincidence, we are supplied, at this "nick of time," with an accurate mean period for the comet and his suite, 33·292 years, instead of the 33 *and a quarter*, the nearest guess that could be made from the meteor-showers. I will presently show how exactly every one of those on record followed on one or other of the comet's unseen passages thus reckoned, and the most noted displays within the fewest months after him. We have, then, no experience or record (unless one presently to be adduced) of what might happen did the comet's body

ever pass the node (say), but a day or less before the earth. But this we know, that should there, even then, be no meteors heavy enough to penetrate to the ground unconsumed, at the slant angles nearly all places meet them, yet if any could reach the ground, it would be in the district (perhaps very small), that met them most perpendicularly, or with the "radiant" in its zenith. And this, we have seen, could only happen to a place having sunrise at the time; but, further, of all the places then having sunrise, it must be that one whose latitude corresponds to the radiant's declination. (Remember that celestial *latitude* and *longitude* are not, like terrestrial, measured from and along the equator, but the ecliptic; and distance from the equator is called *declination*.) If *we* are in *latitude* 51°, no stars can pass overhead but those whose *declination* is 51°.

Now, it has been guessed, because all *other* known meteor-streams are rather annual than periodic,—that is, met nearly alike every time we cross their line, as if distributed round their comet's whole path, while this one is met but at two or three crossings of 33,—that this might be a new comer, not yet travelled rounds enough among us to get so distributed. Hence Le Verrier's great calculation that, taking the meteors' period at 33·25 years, they may have almost touched Uranus (the only planet besides ours that their present orbit could) in A.D. 126, and so got turned from an unknowable orbit into this one. But any correction of the above-assumed period, even to 33·292, changes all that; and neither the Italian, English, nor American astronomers admit this approach to have happened. Moreover, as there were anniversary displays three years apart, even in 931—934, the train was hardly shorter then than now; and, if a fresh arrival in our system, it must yet, you see, have been introduced far more than twice these nine centuries back.

Now, take 98 times this 33·292 from 1366, and you find there was a node passage in B.C. 1897 (remember, that from B.C. 1 to A.D. 1 is but a year, and from B.C. 100 to A.D. 100 only 199). Next find the *declination* of the "radiant" at that time. Sir J. Herschel makes its present *latitude* 9° N. and longitude 142°. This longitude is counted along the ecliptic, eastward, from that circle's intersection with the equator, a point that is always shifting westward (by the earth's top-like movement, called precession) a degree in about seventy-two years, at which rate, therefore, every fixed point's celestial longitude goes on increasing. Making this allowance, then, for thirty-seven centuries, you find what was then the longitude of a point that is now in 142°. The figure will happen to be the only one that saves you all trouble with its declination. Knowing the ecliptic's *ninetieth* degree to be always its northernmost, or in declination above 23°, the "radiant," if in its present latitude of 9°, was simply 9° north of that, or in declination 32° N. So our meteors could only impinge vertically on a place in *the parallel of 32° N.*; and of all such places, that only which was then on *the sunrise line*.

Well, now let me transcribe from a record professedly of occurrences *in the latitude* 32° N., and *the year* B.C. 1897.—"And Abraham was ninety-nine years old.* . . . [Gen. xvii. 24]. And the LORD appeared unto him in the plains of Mamre: and he sat in the tent door in the heat of the day [xviii. 1]. . . . . And the men turned their faces from thence, and went toward Sodom [22]. . . . . And there came two angels to Sodom at even [xix. 1]. . . . . And when the morning arose, then the angels hastened Lot [15]. . . . . The *sun was risen* upon the earth when Lot entered into Zoar. *Then* the LORD rained upon Sodom and upon Gomorrah burning *stone* and *fire* from the LORD, *out of the heavens*. [Heb.] And he overthrew those cities, and all the plain, and all the inhabitants of the cities, and that which grew upon the ground. But his wife looked back from behind him, and she was made [Heb.] a pillar *of salt*" (23-26).

Of these meteors, then (following a node passage of the *same* little comet as ours, in the *same* direction, and from the *same* radiant), the only one particularised, because it buried a person, made her (or was) a pillar of salt. And pillars of salt—of *soda* salts and *magnesian* salts—(the *same chief* and the *same second* ingredient that seem, according to Mr. Browning, to characterise the November meteors) are the matters that, dissolved in the lake, or heaped in forms unknown to geology on its borders, are found to blight and mark off that locality from the whole globe. Another thing indeed it has unaccountable, and contrary to all other earthly phenomena; its depression to furlongs below the sea-level, and this by downward bending of the whole strata. It is now, in no sense, "the plain" that Genesis calls its former state; but is the only district on earth like nothing but a *bruise* of her plump skin, a contusion or indent, as by direct impact of a foreign body. And agreeably with this, we find volcanic outbreaks on the extreme verge of the depressed area; but none within that area. The non-biblical accounts, too, of the event either called it simply a great earthquake, or made that its chief element.

Tradition has poetically but ignorantly derived the country's asphalte and sulphur from the catastrophe, though Genesis distinctly says the former distinguished it before (xiv. 10), and the sulphur veins have lately proved to be part of its deluge-drift or older strata. But neither of these minerals would make the soil barren. The only things that do this are the salts, that geology finds unaccountable intruders.

I must now apologize for one omission made to simplify the above reckoning, and which may seem to have made it look a little stronger than it is. We supposed the "radiant" at its present place among the stars of Leo, but the permanence of the phenomenon shows it to move eastward about equally with the node; and a Chinese account, nine centuries old, confirms this by placing it then in Cancer. In Abraham's time it was in Gemini, and instead of longitude 90°, was as far west of 90° as it is now east thereof. *If in its present latitude*, its declination was the same as now, or about 23°; but its latitude is certainly *decreasing*, and may, for aught we know, have been then several degrees higher, and 8° would give it the declination we assumed above. The exact fact then is this:—That it was within a very few degrees of the zenith of Sodom, or the fall as vertical as any *rain*, is *certain*; and mathematically *exact* verticality (which is nowise required) was quite possible, but is not, as the above made it seem, ascertainable.

Now observe that none of these calculations would be easy, or perhaps possible, had the comet's elements been slightly different, the stream not encountering us so directly at our sunrise line, or not having its perihelion and node within a few degrees of being identical; had it, in short, resembled the August meteors' orbit, or any other known, those would have made the problem one for astronomers, if not almost as insoluble as had the Chinese account of the comet in 1366 not existed. But as surely as the spectroscope came just in time (this comet the very first to be examined by it), so are these numerical data just such as would be chosen if one wanted to make the calculations and argument plain, yea, ridiculously easy, to a schoolboy. This applies even to the comet's period, so near a third of a century, that we may reckon 24 in 799 years. Thus, then, I find an event singularly well monumented. Lot's wife's pillar served in its day; but a far more durable, and how carefully and consummately contrived a monument is this flying through the sky! that non-travellers can examine, and so arranged as to be visible in general once every generation from any single spot on earth,—from some occasionally twice.

I will now tabulate the list of its recorded visits, as the American professor traces them, but connected with the notable one twenty-eight centuries before his first. The times of the comet's passage, except the two in 1366 and 1866, must be taken as what they would have been *undisturbed*. The period found from fifteen revolutions will apply better in calculating many revolutions than a few; for you must observe that planetary perturbations may have lengthened or shortened any single revolution by as much as a year, and even accumulated similar effects for two or three revolutions together. Therefore, we know not whether the showers of A.D. 931, 1399, or 1698 preceded the comet, for it may have been many months earlier than the dates here set down for 933, 1399, and 1699. But we do know from the slight display in 1865, which certainly preceded the comet's passage two months, that he has some vanguard of meteors, though the mass of the procession follows him.

TEMPEL'S COMET (I. 1866) AND ITS ATTENDANT METEOR STREAM.

COMET.		METEORS.			
		Morning of each recorded Shower.			
No. of Visit.	Time of Node-passage undisturbed.	Old Style.	New Style.	Place and Remarks.	By whom observed.
0	B.C. 1898 or 7	B.C. 1898 or 7	July 30 (probably)	Sodom, &c., destroyed at sunrise	Abraham
24	1099 or 8				
48	300 or 299				
53	134 or 3	133 to 129		China, — "Great agitation of stars in these years"	
65	A.D. 268 or 9	A.D. 268 about Sept.		Do.—"Stars fell as rain, all westward"	
71	468 or 9	472 October		Constantinople, — Dust shower	Procopius and Marcellinus
75	600 or 1	600 (no mo. stated)		France,—"Fiery lances flying westward"	Monks
84	900, July	A.D. 902, October 12	October 17	Europe,—Cairo [100]."	
85	933, November	931, " 12	" 17	China, — "More than	Arabs, &c.
		933, " 13	" 18	Spain, Bagdad, &c. — Very noted shower	Arabs and Monks
86	967, February	934, " 13	" 18	China, — "Many shooting stars at once"	
87	1000, June	1002, " 14	" 20	China, — Radiant observed in Cancer	
88	1033, September				
89	1067, January				
90	1100, April	1001, " 16	" 23	France, — "Rain of stars"	Monks
91	1133, August				
92	1166, November				
93	1200, March	1202, " 19	" 26	Bagdad, &c. — "Stars flying from E. to W."	Arabs
94	1233, June				
95	1266, October				
96	1300, January				
97	1333, May			[Prague.—Very noted	
98	*1366, August 26	1366, " 22	" 30	Portugal, France, Italy,	Monks
99	1399, December 11	1399, "		Italy	Monks
100	1433, March 27				
101	1466, July 12				
102	1499, October 26				
103	1533, February 10	1533, " 25	November 4	China,—Europe.—Very noted	
104	1566, May 27				
105	1599, September 11	1602, " 27	" 6	China, — "Many hundred stars dispersing and reconvergieg"	
106	1632, December 28	1634, " 27	" 6	France,—Stone rain	Morians
107	1666, April 11				
108	1699, July 27	1698, " 30	" 9	Europe	
109	1732, November 11				
110	1766, February 25	1766, October	or November	Quito,—Cumana	Natives
111	1799, June 11	1799, November 1	" 12	Cumana	Humboldt
112	1832, September 26	1832, " 1	" 13	Europe,—Greatest sh.	
		1833, " 1	" 13	Americas,—less	Olmsted
		1834, " 1	" 13	North America,—slight	(com
		1865, " 2	" 14	North America,—small	H. A. New-
113	*1866, January 11	1866, " 2	" 14	All Europe,—moderate	
		1867, " 2	" 14	America,—slight	
	* Observed.	1868, " 2	" 14	Europe,—small	Phillips

EDWARD L. GARBETT.

* This year was 1897, even according to the popular margin, if you compare it with that given for Abraham's journey out of Haran (Gen. xii. 4).

ORNAMENTAL ART WITH RELATION TO ETHNOLOGY.

At the Associated Arts Institute Mr. R. H. Soden Smith, M.A., read a paper on "Some Phases of Ornamental Art, considered in Relation to Ethnology."

In introducing his subject, Mr. Soden Smith alluded to a paper read during the last session of the Arts Institute, in which he had stated the theory respecting the classification of art that he had been led to adopt,—namely, the division of all Fine Art into Instinctive, Intellectual, and Moral or Spiritual Art. He then proposed to take one of these classes or divisions,—viz., Instinctive Art,—as his present theme, and proceeded to point out, 1st, its nature and limits, its excellences and defects; 2nd, its development among certain nations.

Some exception may be taken, he said, to the term "instinctive," which cannot with exactness be applied to any operation of the human mind resulting in artistic effort, however humble; but, on the whole, it most nearly expressed the thought he desired to convey. The aim of instinctive art is not high. It occupies itself with surface decoration, and with this, not as subordinate to architecture, &c., but as the only art known, and therefore, primary, instead of, as it should be, secondary. It also, in objects surrounding daily life, shows its influence on form, and, among certain races, with excellent results. In its own sphere it approaches perfection,—a perfection more easily attainable than that of intellectual or moral art, as it seems to be free from the hesitation that belongs to reflection. It is not symbolic, nor truly æsthetic, but makes its appeal to man's sensuous nature. It is limited, therefore, to conventional ornament and forms, whether in the round or the flat, the ornament and forms employed being the result of general rather than particular impressions. When it strives after direct imitation it passes its limits, and fails; thus the efforts to represent the human form that occasionally intrude themselves into works of instinctive art are hopeless failures.

The development of instinctive art among certain races of mankind was then alluded to. First among certain oceanic groups of the Malayan type and amongst Papuans. The objects of daily use, the dresses, and weapons of these races were quoted as admirable examples of instinctive art. Reference was made to a collection of tissues brought from the South Sea Islands in one of Capt. Cook's voyages, and which now belong to the South Kensington Museum. These are decorated by means of the simplest forms and few colours, and are examples of the complete attainment of the object in view. The art of the Mongolian race was next spoken of, Chinese surface-decoration being dwelt upon, and their skilful treatment of colour pointed out. The probability was suggested that the forms which they occasionally use, and often mar in the use, originally were derived from a race of another ethnological type. Vases, for example, of excellent outline have their forms strangely altered by handles or projecting monsters of shapes out of harmony with the rest of the work. Yet the instinct of the Chinese artist enables him at times to redress the balance wonderfully, and for this reason,—the carved wooden stands should not be removed from the vases, incense-burners, &c., to which they belong. They are necessary to complete the conceptions of form, often *bizarre*, which was in the mind of the artist.

Lastly, the instinctive art of races belonging to the Caucasian race, using that title in its wide sense, was treated of, and the surface-decoration of the Keltic nations, especially the British Kelts, was dwelt upon, their skill in the ornament in metal-work being mentioned at some length, and examples of cast, of chased, and of filigree ornament being quoted, and its characteristics pointed out, the peculiarity of certain curves, and especially of the spirals and their distinction from other allied phases of decoration, being indicated. The MSS. illumination of the British and Irish Keltic people was next mentioned for its extraordinary excellence as an example of surface-decoration, its complexity of design and faultless accuracy of execution being illustrated by reference to the "Book of Kells," which dates from the seventh century, and to other examples of nearly contemporary work.

The speaker concluded by observing that, although he might seem to invite attention to a very humble field of art, yet that the subject was not without importance; for if we could aid in any degree in surrounding the daily life of the millions of our countrymen with objects enriched by such art as that on which he had commented, so fit in design, so subtle in conception, so rich in colour, sometimes so marvellous in execution, we might be conscious that we were assisting to raise those around us in the scale of intellectual civilization, and to enable them at length to appreciate the efforts of those nobler arts which shed an immortal light on the fortunate lands where they take root and flourish.

THE SOCIETY OF ARTS.

An able and interesting review of the past history of this society, with suggestions for its future expansion, has been given by Mr. S. T. Davenport, financial officer of the society, in a paper titled "A Glance at the Past and Present of the Society of Arts, with some Suggestions as to the Future." The past was divided into two periods, one extending from the foundation of the society in 1754, by William Shipley, landscape-painter, to what may be called its winding-up, about a quarter of a century ago, and the other extending from that time till now. Mr. Davenport has been connected with the society during the whole of this last period. For the future, he said,—

"I would venture to suggest, in the first instance, some such division as the following, each group being placed under the special care of an expert:—

Chemistry in its relation to manufactures and the arts.

Manufacturing machines and tools.

Trade and commerce, especially including colonial produce.

Education, domestic, social, and economic appliances.

Under some such divisions (he continued) an expansion of our present action might be begun; an expansion which could be elaborated from time to time as additional funds were provided; and under these divisions I believe members would naturally group themselves, and papers might be read periodically in each section.

With industry, according to a list formerly prepared for the society, applied to nearly 1,000 trades, and the discoveries of science daily brought to bear more and more upon them, how is it possible, under our present system, to watch and record progressin this country alone?

I think, also, that it would be a good and profitable investment of money to appoint gentlemen to watch and report on the progress of science and industry abroad, and to translate the records of the published discoveries made in foreign countries for the society's *Journal* and the information of its members."

"The society should watch for and record the wants of industry and art, and offer such honorary rewards for them as their importance demands. Are there no wants in the present day not yet supplied? Do we know all there is to know about metals? Can we puddle iron without a large amount of manual labour? Have we succeeded in constructing a locomotive fit to be worked, and capable of being used in underground railways without creating a nuisance or injury to health? Have we yet ascertained how to bring the surplus food supply of other countries to our own shores? Have chemists exhausted all the sources from which motive power may be supplied, without nuisance, and in so safe and portable a form that horses might be dispensed with on our streets and roads, thereby adding an enormous food-producing area for the benefit of the people of this country? Have manufacturers combined with electricians to apply electricity as it is capable of being applied to increase and extend the artistic powers of the loom? Are there no new oils, gums, fibres, and spices, &c., in India, Africa, and throughout Australia? Do we know how to use petroleum as it is capable of being used? Surely with experts in charge of sections, wants such as these and many others I could name might be recorded and put forward for solution; and though we may not live to see them all realised, still when our successors shall come before the members of the Society of Arts 115 years hence, they may then have to record of them as we do now, that the reaping-machine asked for 100 years ago has been obtained and is regularly at work, and that the hay and the corn that used to be spoiled in wet seasons are now capable of being preserved and harvested for the use of man."

"We started our present society twenty-five years ago, with 300 members. We had to borrow money to pay debts, and members subscribed funds for special purposes. We did work which was appreciated by the public; the public supported us; and we are now a body of 3,000. Let us still endeavour to extend our influence; and I have no doubt that, as, in times past, the seed which was sown in good ground took root, and has brought forth tenfold, those who are spared, if they work vigorously, will, in years to come, be able to say it has brought forth an hundredfold."

In the discussion which followed the reading of Mr. Davenport's paper, very high encomiums were passed on both the review and the suggestions, and the thanks of the Society were unanimously accorded to him at the close.

THE TRADES MOVEMENT.

Manchester Court of Arbitration.—A meeting of the representatives of employers and employed interested in the formation of this Court has been held at the Manchester Chamber of Commerce, and, as their first business, proceeded to the election of a president. It was found that the representatives on both sides had independently selected Mr. Edwd. Ovens, judge of the County Court, as a gentleman specially qualified for the appointment. It was therefore arranged that the presidents of the Chamber of Commerce and Trades Council should wait upon Mr. Ovens to ask his acceptance of the office. Mr. Ovens has accepted the invitation, and at a court held when he was present, he was duly appointed president. Those present at the meeting first mentioned were Mr. Edwd. Ovens (chairman), Mr. J. M. Bennett, Mr. Fereday Smith, Mr. Richard Johnson, Mr. J. Slagg, jun., Mr. H. J. Leppoc, and (representing the Trades Council) Mr. W. H. Wood, Mr. George Jones, Mr. P. Clark, Mr. P. Shorrock, Mr. G. Townley, Mr. C. Swain, and Mr. A. Ridge. The consideration of a code of by-laws and standing orders occupied nearly the entire sitting of the court. These rules will shortly be completed and made public. Mr. Browning, secretary of the Chamber of Commerce, volunteered to undertake the duties of secretary in an honorary capacity for the next six months.

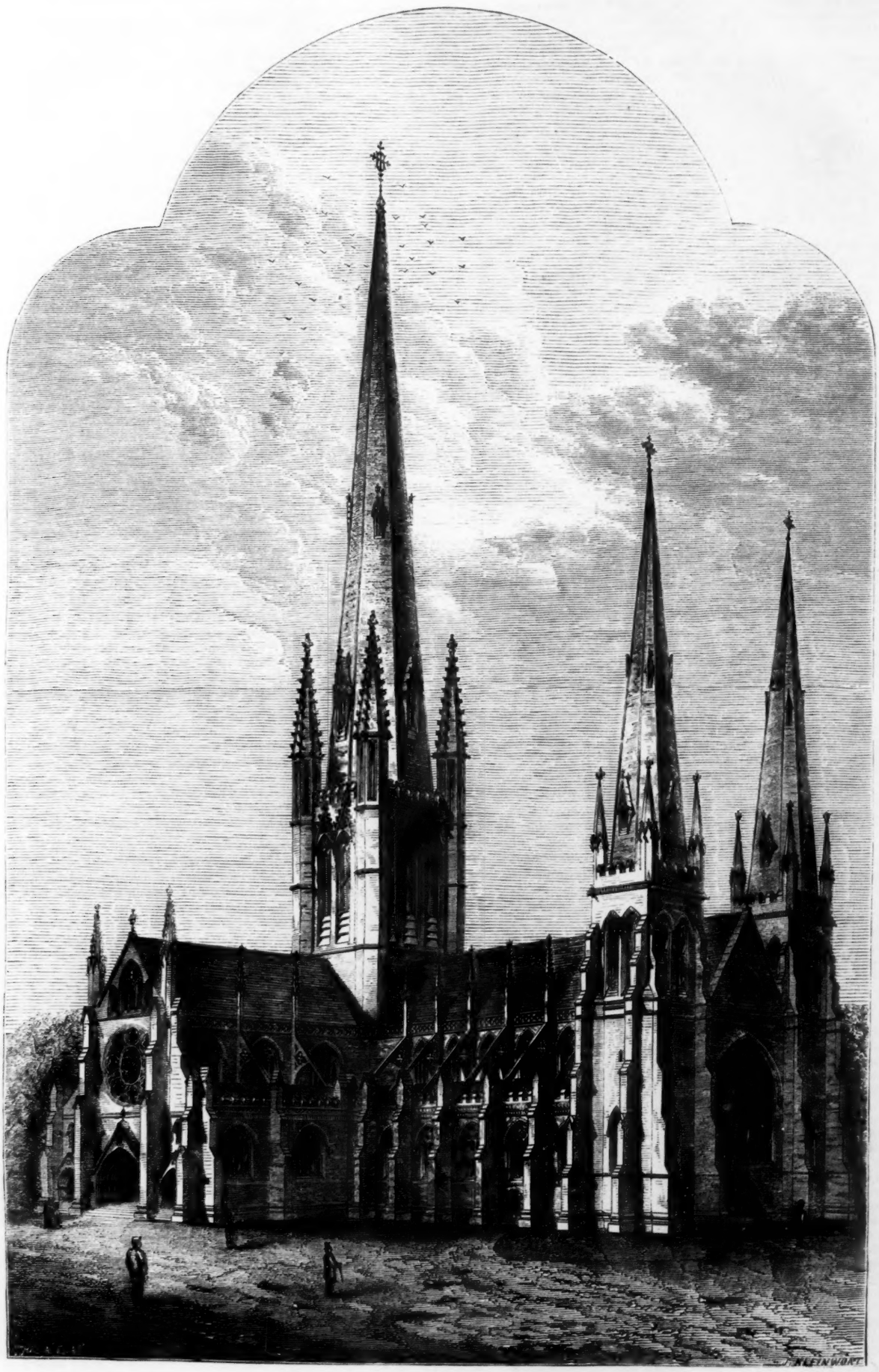
ST. PATRICK'S (R.C.) CATHEDRAL, MELBOURNE.

This important edifice was commenced in the year 1858. The plan of the cathedral comprises nave, transepts, and choir, with aisles to each on both sides. The choir has an apsidal end, and five chapels open out from the aisle which surrounds it. There are two towers with spires, each 220 ft. in height, at the south-west end of the nave, and a lantern tower and spire 330 ft. high at the intersection of the nave and transepts. The extreme length of the church interior is 345 ft. The width inside the nave and aisles is 76 ft. The interior length of transepts is 160 ft.; and the height to the ridge of the roof is 92 ft.

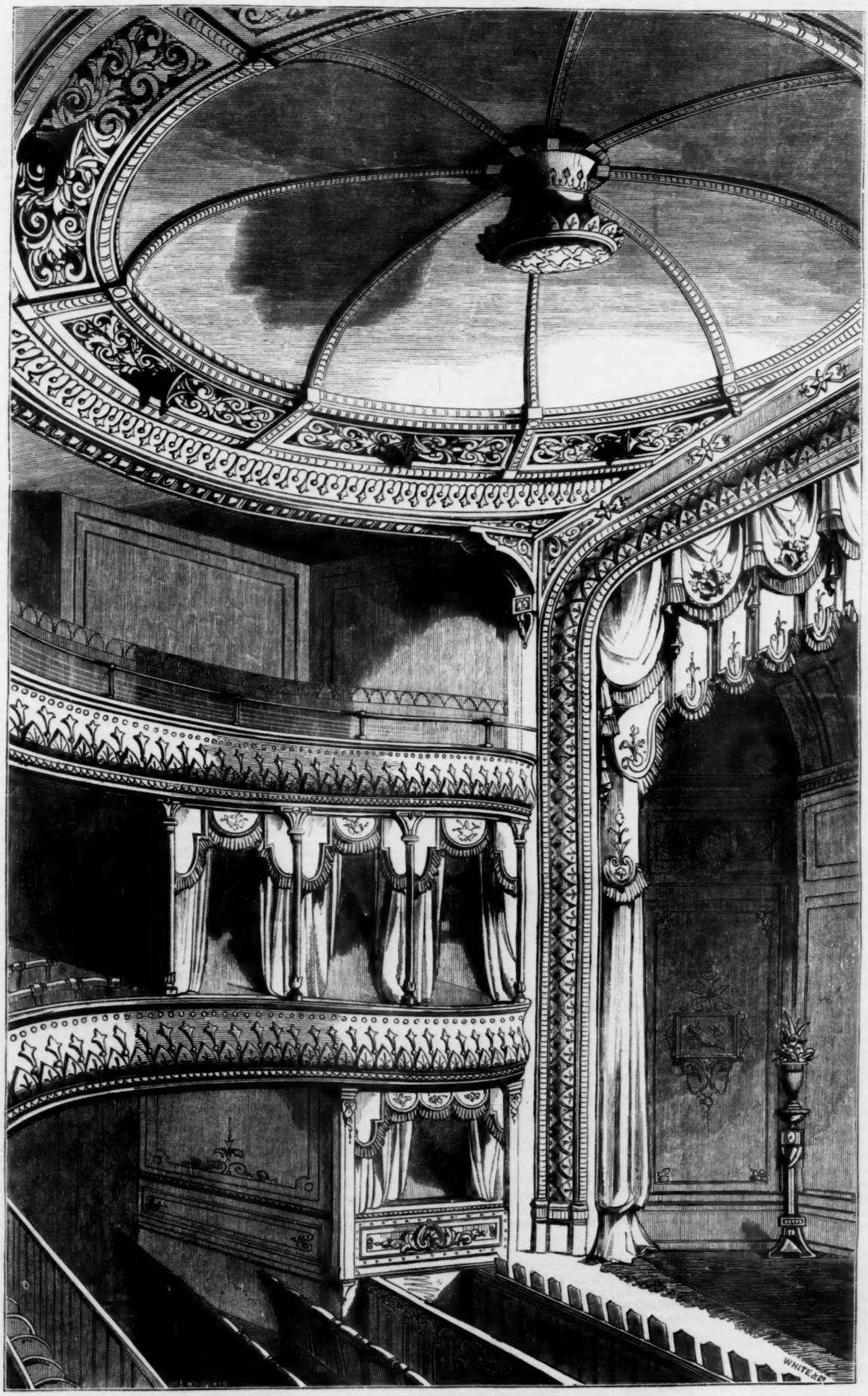
The nave and aisles and two western towers have been commenced; the nave and one aisle are roofed in and nearly completed, and the stone vaulting of the second aisle is making rapid progress. The fittings are at present all temporary. One of the towers is up, ready to receive the spire; the other being complete to the floor of the upper belfry, a portion of the bells have been hung in the western tower. They were cast by Mr. Sheridan, of Dublin. The stained glass is by Hardman, of Birmingham. The principal window in the nave, having for subject the Ascension of our Lord, is well spoken of.

The works are being carried out under the superintendence of Mr. Denny, by Mr. Young, the contractor. Messrs. Wardell & Co. are the architects.

It is proposed to remodel the present house for the bishop, to form part of the grammar school buildings, and the proposition includes a plan for a new house for the bishop, with chapter-house, sacristies, cloisters, &c.



ST. PATRICK'S (R. C.) CATHEDRAL, MELBOURNE.—Messrs. Wardell & Co., Architects.



THE GLOBE THEATRE, NEWCASTLE STREET, STRAND.

[See page 885, *ante*.

IRON AND STEEL SHIPS.*

No one who reads his newspaper can be ignorant of the name and note of Mr. Reed, our navy constructor. This work of his is so replete with practical and detailed instructions to qualify it for its destiny as the base of future examinations in practical iron shipbuilding in the national dockyards, that it is not a book well suited, and especially on such a subject as ship-building, to be used freely as a gleaner's field for our columns; defective, as it is acknowledged to be, in what relates to the history and theory of ship-building. We shall endeavour, however, to give an idea of the author's manner of treating his subject as regards armour-plates and steel in ship-building, premising that the book is divided into chapters on the strength of iron ships; on keels, keelsons, and garboard strakes; on stems; on stern-posts; systems of framing, in various chapters; deck stringers and plating; bulk-heads; topsides; rudders; iron-masts; steel-plates for ship-building; rivets; testing iron and steel; Lloyd's and rules for ship-building; armour plating, &c.

Steel is now regarded by the shipbuilder as a material which may with care be made to possess greater ductility, both hot and cold, than the best wrought iron, in combination with a tensile strength 50 per cent. greater than that of iron. It has on this account come to be largely used by shipbuilders, instead of iron, for plates and angles, and to a great extent for rivets also. There is but little room for doubt that it is destined to a far more extended use than it now has for these purposes; and it is possible that it may ultimately displace iron for such uses. But, in the present state of the manufacture, steel ship-plates, our author thinks, possess some very dangerous peculiarities. There is ample experience, he says, to prove that ships built of steel may be weaker, both structurally and locally, than ships built of iron of the same scantlings, and with precisely similar arrangements of framing and fastening. It may be said, indeed, with truth, he remarks, that if steel supplied by first-class makers is treated in the same manner as iron in working it into a ship, it will require to be of the same thickness as the best iron, in order to obtain the same strength; and that, as the practice has been to reduce the thickness in nearly inverse proportion to the tensile strength of the perfect plate, steel ships so built are by so much inferior in this respect to ships built of iron of unreduced thickness.

Several kinds of steel have been used in ship-building in the form of plates and angles, but there are only two which have had any extensive use, viz., Puddled and Bessemer steels. These two materials differ widely from each other, not only in the mode of manufacture, but in their qualities. Puddled steel plates and bars, like iron, are made from a pile of small pieces, welded together under the hammer, and between the rolls, and are subject to those well-known and troublesome defects produced in these processes, to a greater extent even than iron. Each Bessemer steel plate or bar is, on the contrary, made from a single ingot, and is therefore free from these defects.

"Large plates can thus be made by the latter process with the same precision, and almost with the same ease as small ones, but in puddled steel this is not so. It also appears to be more difficult to obtain uniformity of temper in a batch of puddled steel plates than in Bessemer steel, probably because of the extreme care required in selecting the puddled bars of which each pile is made, as these bars differ greatly from each other in temper, and the selection is made from observation of the nature of the fracture when they are broken. In the manufacture of Bessemer steel, the selection which requires to be made is dependent on precise chemical analysis, which is part of the daily operation of the mills, and is altogether independent of the workmen. Puddled steel is not necessarily inferior in strength to Bessemer steel, but that made in England is generally of lower tensile strength, as well as less uniform in strength."

An important metallurgical discovery, we may here observe, has been recently made, which will have great influence on the manufacture of steel, and how far that may affect the use of it for ships remains to be seen. Bessemer's process is ingenious, and successful with the best kinds of iron, although it is inapplicable to the inferior kinds produced in North-east Yorkshire and in Northamptonshire. Even Bessemer, however, is now beaten by Heaton, a manufacturer in the Erewash valley, for he can take common "pig," and turn it into steel, and by a very simple process. He covers the bottom of a cupola with nitre, pours thereon the molten metal which he desires to convert, and chemistry does the rest. At the end of two or three minutes, a fierce flame bursts from the top of the cupola. Presently all is quiet; the nitre, by the action of the intense heat, is converted into phosphate of soda, and the iron into steel. That is the whole process; and, on opening the cupola, there is a solid mass of steel, weighing from 12 cwt. to a ton, ready for the hammer, and to be wrought into any of the forms in which steel is sent into the market.

As if to be ready for this new steel, too, a "deadstroke hammer" has been recently invented by Messrs. Shaw & Justice, of Philadelphia, which is to excel the ordinary steam hammer of Nasmyth by simplicity and ease of working, as well as economy of steam. Three of these hammers, it is said, can be kept going with the steam required for one ordinary steam hammer, and "any boy in a smithy" may manage one.

In armour-plating iron ships, the practice of Government service is to make a set of moulds representing sections of the outside of the ship, and to fix them in their proper relative positions, so as to obtain an accurate representation of the ship's side in wake of the plating to be taken account of. The slight expense of materials and workmanship thus involved is found to be more than compensated in the accuracy with which the plates can be specified for. Drawings of the various plates are prepared, showing their forms and having the figured dimensions, thickness, and estimated weights marked on them, together with the distinguishing letter and number by which each plate is known. These drawings are forwarded to the manufacturers, and accompanied by printed forms, on which are given the numbers and particulars of the plates ordered. In preparing the specification for armour-plates at the extremities of a ship it is usual to allow a margin of about ¾ in. on each edge and butt above the net dimensions; but for the plates amidships the allowance made is not so great, as they have only a moderate amount of curvature and twist. The ordinary dimensions of the plates used are a length of from 15 ft. to 16 ft., and a breadth of from 3 ft. to 4 ft., but the dimensions of many of the plates necessarily vary greatly from these.

A ship's side has to resist both shot and shell; and one of the most important things to guard against is, the explosion of a shell within the wood backing.

"When the *Warrior* was designed [says Mr. Reed] it was very improbable that any shell would pass completely through the 4½-in. armour and explode in the backing, and therefore a great depth of wood backing was unobjectionable on this ground; but as Mr. Whitworth, Sir William Armstrong, and others improved their shells, this contingency became probable, and hence it appeared to me most important so to adjust the thicknesses of the backing and armour, that a shell, which was large and powerful enough to pass through the armour, should be too large to bury itself within the backing, and explode there. If this were not regarded, it is obvious that a single shell might strip several armour plates from a ship's side, and expose her to speedy destruction. In the *Bellerophon* target this was carefully regarded, as it is not to be expected that a shell large enough to break through a 6-in. armour-plate would be less in length than the thickness of the backing, viz., 10 in.: and the importance of the precaution was signally illustrated, for the shell that did penetrate the plate was stopped by the stout iron skin before it got within the armour, and consequently exploded harmlessly backward through the hole which it had made. By placing the extra iron plate of the *Lord Warden* upon the frames of the ship, the same object is accomplished there also, so that a shell piercing the 4½-in. plate may encounter the 1½-in. plate before it has space to bury itself.

In the *Hercules* target the same principle of construction has been carried out. In the *Hercules* herself, provision has been made for 9-in. armour at the water-line, and for wood backing, varying from 10 in. to 12 in. It was considered that in this case, also, it was out of the question to suppose that a shell which could penetrate a 9-in. plate would be of less than 12 in. in length, and consequently, in this case also, it was presumed that the armour-plate, the backing, and the skin of the ship must all three be pierced, before a shell could do any serious injury to the structure."

We learn, by the way, that Messrs. Napier, of Glasgow, have received orders from the Admiralty to construct the *Hotspur*, a steam ram which bears no resemblance to anything in our navy at present. She is neither a broad-side ship nor a monitor. Like the *Belier*, this vessel is intended to fight end-on. The armour belt at the water-line consists of two strakes of plating, the upper one being 11 in. thick, and the lower one 8 in. She has a formidable ram. On the main-deck is an armour-plated breastwork extending about one-third the length of the ship, similar to that which has been adopted in the new monitors. From the bow aft to the breastwork the main-deck is plated with 3-in. armour; and at the forepart of this breastwork a pear-shaped battery, covered with 8-in. armour, is brought above the upper deck. This battery is pierced with several ports, and contains a turntable carrying an 18-ton gun, the whole being trained, &c., by suitable machinery situated on the main-deck. The only other gun to be carried by the *Hotspur* is a 40-pound Armstrong: this will be placed aft.

The book is valuable.

* "Ship-building in Iron and Steel: a Practical Treatise." By E. J. Reed, C.B., Chief Constructor of the Navy, &c. London: Murray. 1869.

SCHOOLS OF ART.

The York School.—The annual meeting of the friends and supporters of this school has been held in the school, but there was only a thin attendance. The report stated that the condition of the school was satisfactory in respect to the number of pupils as well as their works. The number of pupils in attendance on the various classes during the past year had been 67, that of the preceding year being 51; their attendance had been more regular; they had displayed a greater amount of diligence, and their success had consequently been greater, a statement corroborated by the number who had passed the Government examination and had obtained prizes. Eleven in the second grade, and five in the third grade, had obtained prizes; while thirty-eight had passed in the second grade, four with full certificates; one had been made a free student, and one a pupil teacher with 15*l*.

The Cambridge School.—The annual meeting in connexion with this school for the distribution of prizes, &c., has been held in the large assembly room, Guildhall, the Rev. the Master of St. John's College presiding. A large number of ladies were present, and on the platform to support the chairman were Professor Kingsley (who read a paper on the "Morality of Art"), Mr. Hattersley, the master of the school of art, and others. The chairman congratulated those present on the success of the school, its progress during the past year being of an encouraging character. He regretted the severe loss the school had sustained in the death of Mr. Beamont. The committee reported an increase in the total number attending the school, but they regretted that there was a diminution in the attendance at the gentlemen's advanced class. The number of prizes and rewards obtained by the students from the Government, either in the local examinations or for works done during the year, was much greater than last year. Thirteen were this year selected for national competition at South Kensington, against six of last year.

THE TECHNICAL INSTRUCTION MOVEMENT.

Newcastle-upon-Tyne.—Mr. J. C. Buckmaster has delivered a lecture, in the lecture-room of the Literary and Philosophical Society, on "The Facilities and Grants of Money now offered by Government for Scientific Education." The lecture was well attended, Sir William Armstrong occupying the chair. After Mr. Buckmaster's address, practical observations were made by various speakers, and it was resolved "That a committee [named] be appointed to assist the two gentlemen sent down here to promote the formation of classes, for the purpose of making representations of the defects in the present arrangements, and to lay before the Government those little difficulties which fall in the way of the inauguration of these classes."

Blyth.—A public meeting has been held in the lecture-room of the Mechanics' Institution, Blyth, for the purpose of increasing the interest in evening classes for instruction in geometrical drawing, machine drawing, building, construction, &c. The Rev. W. Greenwell, vicar of Horton, presided. Mr. W. T. Rowden, associate of the Royal School of Mines, London, was in attendance, and explained the advantages and objects of such classes, and showed how they could be wrought in connexion with the Government Department of Science and Art. The meeting was also addressed by the Rev. W. Dromgoole (Roman Catholic), the Rev. T. Clifton (Congregational), and Mr. G. B. Forster. The committee of the Blyth Mechanics' Institution inaugurated two successful classes last winter—one on marine architecture, the other on geometrical, free-hand, and perspective drawing, conducted by Mr. Wallace, National School teacher. Several pupils obtained certificates at the last March examination.

Banbury.—The annual meeting of the Committee of Management for the Banbury Science

School has been held in the Council Chamber, Town-hall. Mr. B. Samuelson, M.P., the president, occupied the chair. The annual report was adopted. It was reported that efforts had been made in the neighbourhood to establish classes for science instruction, and that in one case (Deddington), these efforts were likely to receive encouragement, as classes were now being conducted in Elementary Mathematics and Physical Geography. Classes for Banbury were arranged for the next session, on Animal Physiology, by Mr. J. H. Beale; Elementary Mathematics and Physical Geography, by Mr. A. Owen. The chairman was requested to obtain the assistance of Sir H. Verney, M.P., in the formation of classes at Buckingham. Mr. Samuelson expressed a hope that as the Banbury Science School was one of the first established in connexion with the Government Department of Science and Art, every effort would be made to secure permanent successful working for the various classes in the town and neighbourhood. He called attention to the efforts that were being made in the North of England; where through the agency of schoolmasters' classes, science instruction was being pushed with marked success. He especially called the attention of the committee to the minute of the department which allows grants for building purposes to committees of science classes, and expressed a hope that advantage may be taken of the same. The minute is as follows:—

"A grant in aid of a new building, or for the adaptation of an existing building for a School of Science, may be made at a rate not exceeding 2s. 6d. per square foot of internal area, up to a maximum of 500*l.* for any one school, provided that the school

(*a*) be built under the Public Libraries Act, or

(*b*) be built in connexion with a School of Art aided by a department building grant.

And provided that there is a population in the neighbourhood which requires a school of science; that it is likely to be maintained in a state of efficiency; and that the site, plans, estimates, specifications, title and trust deeds are satisfactory."

COMPETITIONS.

New Church, Brownswood Park, South Hornsey. In a private competition for this new church, four designs were sent in, by Messrs. Wallen, Joseph James, Theodore Green, and Bacon & Bell. The design of the first-named gentlemen has been selected for erection.

THE NORTHERN ARCHITECTURAL ASSOCIATION.

The quarterly meeting of this body was held on the 26th ult. in the Old Castle, Newcastle-on-Tyne; Mr. J. Watson in the chair. The secretary announced that he had been in communication with the Architects' Benevolent Society; and they had advanced 10*l.* to the widow of one of the late members of this Association. The Association (added the secretary) subscribed annually; and this was the third time that help had been received. It was resolved, on the motion of Mr. R. J. Johnson, seconded by Mr. Frank Charlton, that a letter of condolence be sent to Mrs. Green, on the death of her husband, Mr. John Green, the late president of the Association. The report of the Architectural Alliance was read; and Mr. R. J. Johnson announced that he had attended the annual meeting in London, on behalf of this Association. The secretary called attention to a very important matter in the last paragraph of the report, referring to the facilities for architectural education in the neighbourhood; and also read a letter from the Alliance on the subject. Mr. Fowler moved, and Mr. Oliver seconded, that the report and letter be referred to a special meeting. The secretary received instructions to write to the secretary of the Glasgow Architectural Association to inquire what steps had been taken by that society for the purpose of registration, and under what Act of Parliament. The Society then proceeded to elect the officers for the year, as follows:—President, Mr. J. Watson; vice-president, Mr. R. J. Johnson; hon. treasurer, Mr. F. Charlton; hon. secretary, Mr. Thomas Oliver; hon. solicitor, Mr. G. W. Hodge; committee, Mr. Hogg, Mr. Fowler, Mr. Thompson, Mr. Parnell, and Mr. John Johnstone. The president returned thanks for the honour they had done him. He felt the honour the more from his being the successor of his late lamented friend, Mr. Green.

SANITARY MATTERS.

Typhoid at North Shields.—Last week, says the *Lancet*, we informed our readers that fifty-six deaths have lately occurred from fever in North Shields; and, from the various accounts we have published of the disease, it is very moderate to compute that 1,000 people have been ill, out of a population of about 35,000. There has been no coroner's inquest over any one of the fifty-six deaths, and the illness of a thousand does not seem to have occasioned much anxiety. It would take an alderman's death, or town clerk's, to startle the authorities into an inquiry worthy of the occasion. There has been no investigation by the Privy Council, so far as we know, though the outbreak is far more serious than the one at Guildford. We have no reason to doubt that Mr. Simon would find the North Shields outbreak as "instructive" as the Guildford one, and as valuable an illustration of "excremental poisoning." It is high time the Sanitary Commission which has just been appointed should begin its inquiries. It cannot have a better subject to start with than this outbreak of typhoid at North Shields, and the slight attention excited by it.

On the Use of Sewage at Parsloes (Barking).—We have the summer's history before us in a report on certain half-acre beds of land near Barking; and it throws considerable light upon the sewage question. A nine-acre field, of a fair loamy soil, lying a mile beyond the utmost point to which the Metropolis Sewage Company then sent their North London sewage, was during the month of May, ploughed and reploughed and thrown up into ridges 18 yards wide and nearly a yard high. Meanwhile, a line of troughing which should command this field was erected on posts some 12 ft. high at the sewage end—landing their contents, however, in a stream just above the level of the furrows along the ridge-lines of these beds. Mangold plants, says the report, were transplanted into the blanks from a seed-bed, sown so late as June 9th; and by-and-by the sewage was available, and the appearance of everything soon changed, almost as by magic. And now the straw of the Indian corn, the crop having been long since gathered, is standing 6 ft. or 7 ft. high; the mangold ridges, not altogether evenly covered, for some of them had been transplants and others had been seedlings, are covered with a heavy crop, probably nearly 40 tons per acre, many of them heavy, handsome roots; the cabbages have been sold after the rate of 30*l.* per acre; the kohl rabi, not so good a crop as the others, yet promises a very fair return; and some of the remaining ridges are covered with a very vigorous and bushy crop of late-sown turnips. The detailed history of the field is one of the most surprising testimonies to the fertilising power of London sewage that has yet been borne.

Sanitary State of the Army in India.—The report of the sanitary commissioner for 1866-7 shows that the death-rate of the European army was 30·95 per 1,000 men. This was more than half as high again as in the previous year, much higher than any year since 1861, when it was 45·93 per 1,000. The rate of 1861 was the highest on record, and of 1866 the lowest. 1,071 deaths from all causes occurred, and of these 471 arose from cholera. The per-centage of deaths from cholera per 1,000 was 13·84. Next to cholera, the largest number of deaths was due to fever.

THE SANITARY STATE OF SHOREDITCH, AND THE DWELLINGS IMPROVEMENT ACT.

The vestry of Shoreditch are considering several important matters relating to the sanitary condition of the parish. A meeting was recently convened by requisition, for the special purpose of considering a report from Mr. Sutton, the medical officer of health, suggesting the expediency of carrying out the provisions of the Act 31st and 32nd Victoria, cap. 120, entitled "An Act for providing better Dwellings for Artisans and Labourers."

The report stated that during the two weeks ending with the month of October last, there had been nineteen deaths from contagious diseases registered in the parish; that there had been an outbreak of typhus fever in the Holywell district; that eleven persons had suffered from typhus in Bath-place, Curtain-road, all of whom had been removed to the Fever Hospital; and that isolated cases had occurred in Willow-gardens, Garden-row, Eleanor-place, Chapel-street, Royal Oak-walk, Pitfield-street, and the neighbourhood of Hoxton Market. Notices had been served on the owners of the houses in which these cases had occurred to cleanse and disinfect the same, and the beds and clothes were ordered to be destroyed. In several instances notices had been served on owners to close the houses, as being unfit for human habitation, and the medical officer recommended that the vestry surveyor be requested to report upon certain houses in Charlotte-court, Charlotte-street, Curtain-road, as to whether they can be rendered fit for human habitation by alteration, or it is necessary that they should be rebuilt. The medical officer strongly urged the vestry to carry out these recommendations, on the ground that the house property around Garden-walk, Ingram's-buildings, Charlotte-court, Dennis-place, and that district, is in a very bad state, the houses being in such bad structural condition that it is almost impossible to keep them in a good sanitary condition. The result, he states, is, that these houses are frequently the dens of fever, and if fever break out in one house it generally spreads to several others. Moreover, he continues, now that the owners of this property are beginning to recognise the necessity for pulling down such houses, it is very important for the health of the artisans and the labouring classes of the parish that the owners of such bad property should know that the vestry have the power to compel them either to greatly improve or to rebuild these houses. It is not intended, he observes, that a number of these houses should be closed at once, but that measures should be taken to compel the owners to improve and reconstruct such houses by degrees.

A discussion followed the reading of the report, when very different opinions of the propriety of interfering were expressed, and ultimately the meeting was adjourned till the second Tuesday in January, the clerk meantime to furnish each vestryman with a copy of the Act.

RAILWAY MATTERS.

City Railways.—A new method of applying steam for locomotive purposes on street railways, so as to avoid the use of fire in the engine while running on the streets, has been exhibited at Philadelphia on a temporary track. In this engine the necessity for a fire-box, smoke-stack, &c., is done away with by substituting a tank or reservoir for holding water previously heated to a high temperature in a stationary boiler. The water is forced into the locomotive tank, and is said to be capable of giving off an amount of working steam for a considerable length of time sufficient to drive the engine and draw one or more carriages. The new locomotive weighs about five tons when fully supplied with the requisite storage of heated water. At the trial it ran forty-five minutes, making 125 stoppages and reducing the steam pressure from 80 lb. at starting to 20 lb. when the trial ceased. The temperature of the water is kept up by a non-conducting jacket 3 in. thick around the tank.

Communication between Guards and Passengers.—A series of experiments have been made on the North-Eastern Railway system, with a view of testing various methods of communication between passengers, guards, and drivers, which have been devised in view of the adoption of one general system in April next, when a provision of the kind becomes compulsory on railway companies. Four experimental trains were run, and the general managers and other officials of the Great Northern, South-Eastern, Manchester, Sheffield, and Lincolnshire, Midland, London and North-Western, North-Eastern, and other companies were present, and travelled in the trains. The results will lead to a conference with the different managers, and form the basis of a suggestion to the Board of Trade for a uniform system of signalling in passenger trains.

A Railway Train Smashed by Indians.—A freight train on the Union Pacific Railroad has been captured by Indians, about a mile west of Alkali Station. The Indians effected the capture of the train by cutting the ties in the centre, and thus spreading the rails, so that when the train came along, about two o'clock in the morning of the day stated, it was piled up together, and made a wreck. In the smash the fire-

man was killed. All the men of the train fled when the disaster occurred, to escape from the Indians, except the engineer, who remained with his dying fireman. The Indians burned the railway-bridge near by, for the apparent purpose of destroying a passenger train that was soon to follow the freight train already destroyed; but the division superintendent immediately telegraphed west to the coming passenger train, and stopped it. He also telegraphed to Fort Sedgwick for troops; but when they arrived the hostile Indians were all gone. When he arrived at the scene of the disaster there were about 100 Indians congregated on an adjacent hill around a bonfire. Very quickly after he saw similar bonfires lighted successively, as signal lights, on the distant hills, around each of which he could see bands of Indians. He calculates that their whole force amounted to 1,000 warriors. These Indians were Sioux and Cheyennes. Railway travelling in the Far West must be rather exciting.

THE RESTORATION OF ST. NICHOLAS'S STEEPLE, NEWCASTLE-UPON-TYNE.

AT a meeting of St. Nicholas's Steeple Restoration Committee, the Secretary read a report, which said,—

"In obedience with the resolution passed at the last meeting of the Committee of Management, application was made to the town council to levy a voluntary rate of 3d. in the pound upon the rated inhabitants of the borough, for the purpose of raising the necessary funds to complete the restoration of St. Nicholas's steeple, in conformity with the plans and specifications of Mr. Gilbert Scott. The committee have the satisfaction to report that the town council very promptly acceded to their request. It is estimated that it will require about 7,000*l.* to perfect the restoration, against which 2,942*l.* 13s. 7d. have been paid or promised. Some of the largest subscribers to the fund, before contributing, stipulated that there should be no partial measure, but that the work be thoroughly and effectually done. The committee having secured from a first-class builder a contract undertaking to do the whole of the restoration as recommended by Mr. Gilbert Scott, at 1,223*l.* below the average of other eight tenders which were sent in to the committee, it is extremely desirable that so favourable a contract should not be lost; they have therefore to express the earnest hope that the public will liberally respond to the voluntary rate, and thus enable them to reap the full advantage of the tender made by Mr. Walter Scott, and also keep faith with those contributors who only subscribed upon the understanding that the work should be carried out in its entirety."

It was resolved that the report be received and printed.

The Secretary gave the following financial statement: — Subscriptions promised, 2,943*l.* 13s. 7d.; unpaid, 292*l.* 2s.; total received, 2,650*l.* 11s. 7d. Disbursements—Contractor, on account, 2,100*l.*; architect, 100*l.*; clerk of works, 303*l.* 9s. 11d.; advertising, &c., 83*l.* 5s. 6d.; total, 2,586*l.* 14s. 10d., leaving an available balance of 63*l.* 16s. 9d. The amount for which they were now liable to the contractor was 1,600*l.*, on the second division of the contract. The secretary added that Messrs. Robert Stephenson & Co., although they gave 100*l.*, had now paid the voluntary rate amounting to nearly 30*l.*; and Mr. Budden, their chief manager, had gone over the work, and expressed the greatest satisfaction with it.

It was resolved that notice be given to the contractor to proceed with the third division of the work.

MIRFIELD TOWN-HALL.

MIRFIELD, near Huddersfield, has provided itself with a town-hall, and it was opened on the 25th ult. The building has been erected from the designs of Messrs. John Kirk & Sons, architects, of Huddersfield and Dewsbury, and is situate in Easthorpe, abutting on the turnpike-road. The structure comprises, on the ground-floor, a hall, 90 ft. long by 40 ft. wide, having seating accommodation for 900 persons, with an orchestra of 600 performers, also side and end galleries of extent sufficient to accommodate 300 persons, making the total sitting accommodation of the hall for 1,000 persons. There are five entrances to the hall and three to the galleries, the principal one being from the main road, and two others from the side street, all of which have vestibules, and contain ticket offices, and staircases to the galleries. Under the orchestra in the hall are two private entrances, and ante-rooms suitable for the use of committees, &c., and beneath these, on the basement floor, are the cooking kitchen and warming apparatus for warming the building. In front, and abutting on the main road, are four lockup shops with cellaring. Above these, and approached from the main road by the gallery staircase are suites of offices and a reading-room 38 ft. by 20 ft., with lavatories. The roof of the great hall is formed with nine principals, composed of rafters and collar-beams, the principal portion of the lateral pressure being sustained by a moulded circular flitch rib in three thicknesses, bolted together; the spandrels are filled in with ornamental cast-iron work, which serves to bolt the whole together as well as to enhance the general appearance. These principals are dressed and partially exposed, and divide the roof into ten compartments; they are stained and varnished, and supported at the walls upon projecting moulded corbels. The ceiling is 40 ft. from the floor, and the hall is lighted by means of skylights in the roof. Externally the principal features of the building are the south front, consisting of a central projecting clock-tower, and containing the principal entrance, flanked on each side by the shops. The style of the architecture is Italian, freely treated. The stone has been obtained from the local quarries, and the cost of the entire building has been about 4,000*l.*

LIGHTHOUSE BUILDING.

THE INSTITUTION OF CIVIL ENGINEERS.

ON November 24th, the paper read was on the "Roman Rock Lighthouse, Simon's Bay, Cape of Good Hope," by Mr. John Frederick Bourne.

The object of this communication was to point out the causes of failure of the original structure, and to give an account of the mode of securing the tower against further injury.

The late Mr. Alexander Gordon was intrusted with the design, and with the superintendence of the construction of the ironwork and lantern in England. The design was for a circular tower, 15 ft. in diameter and 48 ft. in height, of cast-iron plates, with a central column, 16 in. in diameter, as a well for the weight of the revolving machinery. There were eight plates in the circumference of the tower, and six plates, each 8 ft. long, in the height. But to admit of the horizontal joints of each vertical set of plates breaking joint with those of the contiguous vertical sets, there were four plates of 4 ft. high each and four of 8 ft. each in the first and last sets of plates. The door-cill and level of the first floor were 24 ft. from the foundation; the whole interior up to that level being intended to be filled in with concrete. If the building, as resigned, had been skilfully and carefully erected, and filled in with good material, there was no reason to doubt that it would have answered the required purpose, and have stood well. But it failed, and was condemned as being dangerous.

The first cause of trouble, and which led to immense additional expenditure of time and money, arose from the lowest portion of the rock being chosen for the site, on account of its being more level. The next error was cutting the foundation pits too deep into the rock, for the purpose of getting as much solid core as possible for the inside of the tower. In order to give a core of 6 in. at the lowest spot, it was necessary to leave it 2 ft. 9 in. high at the highest point; and as the groove was formed by blasting, for the sake of saving labour and time, the rock was much injured. Every sea of course filled the annular foundation pit, rendering it difficult to work. Two channels were therefore made, by blasting, one on each side, to allow the water to run off; and these channels were very annoying at a later period. It was found impossible to cut the foundation pit true and level, or so difficult that the attempt was abandoned; and the holding-down bolts were so imperfectly secured that some of them drew when screwed up. Nor was the circle true in plan. Not only had the bottom flanges of the plates to rest upon uneven bearings, being wedged up in some places with blocks of teak, but they were forced, when screwed together, to take a form to which they were not cast. When the plates were tightly bolted together, and the concrete was filled in to its full height of 24 ft., the plates began to crack vertically in six different places, one crack extending 28 ft. high; so that it became necessary to hoop the tower with wrought-iron hoops. In this condition the lighthouse was completed, and was used for some time. The erection occupied five years, and the cost was stated to have been about 17,000*l.* The lighthouse was built by the Imperial Government, and the arrangement was that when completed to the satisfaction of the Colonial Government, it was to be maintained and lighted by the colony. Owing to its patched-up state the colony refused to undertake its maintenance, and consequently a long correspondence ensued, when a proposal, made by the author, was eventually adopted by the Board of Trade, that the tower, as it stood, should be surrounded to the level of the first floor, a height of 24 ft., by a concentric ring-wall of granite, 4 ft. thick, with a backing between the wall and the iron plates of about 8 in. of cement concrete.

The arrangements for conveying the stones to the rock, for landing them there, and for setting them by means of a traveller running on a circle of fished railway bars fixed round the tower, were described. Copious extracts from the resident engineer's journal of operations were also given, from which it appeared that the foundation pit was cut by drilling holes, 1¼ in. in diameter, in concentric and radial lines, to the required depth, and breaking the pieces out with plug and feather. The bed was then dressed until it was perfectly true. The whole foundation was got out in two levels, the lower one not being so deep as the old foundation pit, or as the channels previously referred to. The journal shows that in 269 days after the work was commenced, in 1864, there were 102 days on which it was possible to do something on the rock, in 356¾ working hours, whilst in the same number of days in the year 1865, there were only 42 days when the work could be proceeded with, for 126¼ working hours. But the year 1865 was exceptionally bad. The number of hands employed, all told, was generally nineteen. The four masons and two smiths received 6s. 6d. a day each, and the labourers who were employed in drilling, quarrying, and rough-dressing, and in pulling out to, and back from, and working on, the rock, received 4s. 6d. a day each. It was satisfactory to be able to record, that the whole work was completed without any serious accident to the men. No difficulty was experienced in filling in the old pit and gullies in favourable weather, with Portland cement mixed with very little sea-water and chips of granite from the quarry. A temporary protection for each short length of pit, as it was about to be filled, was made with gunny bags, filled some with sand and some with clay. As the stiff cement and flakes of granite were laid, they were covered with tarpaulin and bags. Some time elapsed, owing to adverse weather, before the courses of stones could be laid. The work was commenced on the lee side of the tower, and carried round to windward on both sides for the first three courses, after which each course was commenced to windward, as, being 6 ft. high, it was not so much exposed to the force of the sea, and it was more convenient in bringing round the stones. By the end of 1866 the work was at its proper height for putting on the coping. This was completed early in the following year, when the lighthouse was taken over by the Colonial Government.

BUILDERS' BENEVOLENT INSTITUTION.

THE twenty-first anniversary festival of this Institution was celebrated on Thursday evening (26th ult.), at the Freemasons' Tavern, Great Queen-street, Lincoln's-inn-fields, Mr. George F. Trollope (president) in the chair. The entire number of friends and subscribers who attended amounted to 250.

On the removal of the cloth, the usual loyal toasts were given, and duly honoured.

The Chairman next proposed "The Army, Navy, and Volunteers," to which Lieut.-colonel Thorpe briefly but very suitably responded.

The Chairman, in proposing the toast of the evening, "The Builders' Benevolent Institution," referred to the foundation of so valuable an Institution, which for twenty years had been pushing onward in the work of doing good. He contrasted it with the Society of Painters, to which he had the honour to belong, and showed the advanced growth of the Builders' Benevolent Institution, as to its giving relief to decayed members of every *branch* of the building trade, as also to their widows; the male pensioners receiving 24*l.*, and the women 20*l.* per annum. This might not appear much, but to the poor it was a great deal. In some cases the recipients lived with their friends in the country; and when the time came round for the payment of their money, it was received with joy and gratitude. In other cases, it materially assisted in keeping them out of the workhouse. Under all circumstances, the Institution was progressing,

and very deservedly so; and he hoped that all the friends and subscribers would continue and further their support and interest, as there was yet much to be done to meet the requirements of the Builders' Benevolent Institution.

Mr. W. R. Rogers, in support of the toast, strongly showed the necessity for builders aiding the Institution, which had now attained its majority. He said that with builders, in the undertakings they had frequently in hand, there was no doubt a vast degree of talent and assiduity required to carry on the works successfully. But notwithstanding that talent and assiduity, they all knew that obstinate adversity had appeared, and the heretofore wealthy man had irrevocably fallen. It might be said that he had done that which he ought not to have done; that he had entered into speculations which he ought not to have entered into. But enterprise and speculation were one; for without the combination enterprise would be constrained. Enterprise, in fact, was speculation. The small sum of 24*l.* per annum had been alluded to, but, as a charitable grant, he was of opinion that it was very acceptable in old age. In August last, the number of pensioners on the funds was forty-eight, and he thought they ought not to scruple at having one hundred on the books. There were numbers of gentlemen who were all in some way connected with the building trade, and to these he would suggest that they should give a hearty and continuous support to this very praiseworthy undertaking.

The toast was drunk with great enthusiasm.

Mr. Geo. Plucknett proposed "The health of the Chairman and President." He was fully aware, in introducing that toast, it would be satisfactorily and cordially received. That gentleman (the chairman) being largely connected as he was with a great business, had the opportunity of giving up a portion of his time to works of charity. In that spirit of philanthropy he felt that in bestowing his attention on the Builders' Benevolent Institution he would thus promote good objects.

The Chairman briefly returned thanks. He said he was fearful that his efforts to promote the interests of the Institution would not be adequate to his wishes. He, however, trusted to extended assistance, for there were yet many anxiously waiting to become recipients of the funds.

Mr. R. Crockett proposed "The Patrons, Vice-Presidents, and Trustees," and associated with that toast the name of Mr. Thomas Cozens, the founder of the Institution, through whose zeal and untiring energy the Institute had breasted difficulties until it had attained its present strength. He much regretted that Mr. Cozens was prevented from being then present among them as he was suffering from illness. There was, however, another gentleman among them who had also been a hardworking promoter of the interests of the charity. He meant Mr. John Thorn, who had devoted much time to the Institution's well doing. He repeated the toast with the above names conjointly added.

Mr. J. Thorn, in reply, also regretted the absence of his friend and colleague, Mr. Cozens, with whom he had worked hand-in-hand both as committeeman and otherwise for many years. For his own part, and also on that of Mr. Cozens, he could say, that as long as they had the power and ability they should devote themselves to the welfare of the Institution, with a hope and trust that the ultimate wish of the founder may be realised.

The Chairman then proposed "The Health of the Treasurer," whose name it was not necessary to mention.

Mr. George Plucknett sincerely thanked the meeting for the kindly manner in which they had drunk his health, and congratulated the committee on the result of their really hard work. The donations and subscriptions were more that night than usual, making altogether nearly 500*l.*, and he hoped that each succeeding year they might realise as much. It would not all be spent, but carefully watched and appropriated as deemed most advisable. The funded stock now amounted to about 15,000*l.*, and he trusted, therefore, that in a few years the pension would be increased from 24*l.* to 30*l.* per annum.

The "Architects and Surveyors" was the next toast, on which the Chairman referred to the feeling of respect and hearty co-operation which existed between them and the builders.

Mr. Franklin responded.

The Chairman then gave the last toast, "The Directors and Stewards."

Mr. Wilfred Nicholson (a director) returned thanks, and spoke of the anxious desire he and his brother directors had to support creditably and permanently the establishment in which they all had so great an interest. At the fall of the present year they had not their usual election, simply because it was deemed prudent not to throw another pensioner on the list. They would wish to take in all, but at present they were unable to do so. The builders were a class different from others, and when a brother met with vicissitudes, little or no sympathy was obtained. How necessary was it, then, to extend as much as possible the usefulness of the Builders' Institution, so that by and by they might show a very large success and a very worthy treasury. A few friends might do a very large amount of work. They might enter the whole metropolitan area, and, by the obtaining of new subscribers, greatly enhance the income. Reverting to the vicissitudes by which men of their class were stricken down, he said many who had held high positions,—not by any fault of their own, had fallen: one, a former member of the board of management of that Institution, at that time was a grateful recipient on the funds. They required a large amount to help all who were in need, and, therefore, the more benefactors they had the better. The trade did not consist alone of those connected with bricks and mortar.

Mr. J. Bird said there were 16,000 persons associated with the building trade, and he had no doubt that a great number who had not before subscribed could be prevailed upon to do so, and then, instead of only electing one or two of their poor brethren, they might be enabled to elect all and support them ultimately without touching the material funds of the Institution.

DRINKING FOUNTAIN, SHEPTON MALLET.

A DRINKING-FOUNTAIN has been erected and opened at Shepton Mallet. The base stone is of Cornish silver-grey granite, furnished by the Messrs. Clemens, of Truro. Partly in relief, and partly sunk in the stone, are two dog's troughs. Around the base stone is placed a step of Pennant stone. The spur stones are of Cornish silver-grey granite. After a block of freestone laid on the granite base stone, there is a block of polished mountain limestone, each face having paterœ carved in high relief. The stone was obtained from Waterlip quarry. The bowl is of highly polished red and green Cornish serpentine, furnished by the Lizard Serpentine Company. Fern-leaves are carved on it in relief. The carving was done at the company's works at Caerleon Cove. It is made always to contain water, to prevent the splashing that would otherwise arise if the steam of water fell directly on the stone. The stream is incessant, and flows from a brass spout. From the level of the bottom of the bowl springs at each angle of the structure a polished serpentine shaft (blood red and black, black and green, &c.; also furnished by the Lizard Serpentine Company), which sustains the angles of the canopied arch that terminates the structure. The bowl is set in diaper work. The capitals, instead of acanthus, are roses, wheat, and geraniums. The under faces of the canopy are carved in strong relief, each side different, passion flowers, roses, German ivy, common ivy, convolvulus, bramble, &c., are severally introduced. The roof edge of the arches is crocketed; the apex finished with a finial, each of different pattern. From the valleys of the roof spring at each angle a crocketed pinnacle, carried on a short shaft. The roof is carved with a fish-tail tile pattern. The centre of the roof carries a lamp-pillar, cast by Messrs. Turner & Allen, of London. The lamp, which was also furnished by them, is one of Forrest & Co.'s patent cylinder lamps. The lamp and pillar are painted maroon, relieved with gold, by Mr. Smith, of the Market-place, who also fixed and provided all the pipes, &c., required throughout the structure free of charge. The carving was done by Mr. William Halliday, of Wells. The builder was Mr. Emery, of Town-lane, who not only carried out the work without profit, but subscribed towards it. The entire work was carried out under the personal superintendence of the architect, Mr. T. J. Hicks. The freestone is from Doulting. The cup is of silver-plated nickel, and was the gift of Mr. Cuzner. The whole work has been treated with a solution of soap and alum as a preventive against decay and parasitical growth.

SOCIETY OF ENGINEERS.

SIR,—I trust you will allow me, through the medium of your paper, to call the attention of the members of the Society of Engineers to the balloting list of proposed new members of council for the ensuing year.

There are seventeen candidates, and twelve only can be elected. The outgoing council have as usual nominated themselves with one or two exceptions, and will, no doubt, vote for each other and get their friends to help them to get returned.

I beg to suggest that, following up the Conservative tactics, the members should plump for eight candidates, including the five new candidates not in the outgoing council's list. This will ensure the return of the new candidates, and infuse new blood into the council, which, I need hardly say, is much required.

A MEMBER OF MANY YEARS' STANDING.

THE NUMBERING OF STREETS.

SIR,—I noticed in your paper recently a suggestion as to the "numbering of streets," and no doubt improvement is required there. The proposition, however, would not meet all the difficulties. The principle of numbering streets by putting all the *even* numbers on one side, and the *odd* numbers on the other, answers remarkably well. The difficulty now to be got over is, *how to see the numbers at night, or with gas-light.* As a *step* in the direction of overcoming this question, I would advance, that on *two sides of every gaslamp* in the public streets the *number of the house immediately opposite it* be printed on transparent paper, gummed or pasted on the inside of the glass. This plan would confine the *search* for a number to be betwixt the lamps; and these *catch numbers* would be illuminated *free* of cost, and be discernible so long as the street lamps were lighted; and when these lamps were put out, parties at a loss for their house numbers could just take the hint, that the public authorities did not intend to encourage *late walkings.* But in addition to this, I would have the "name of the street" put on each lamp in the same manner. I have seen the names of streets done in this way; the light is imperceptibly affected, and the advantage, especially to strangers, is very great. In fact, in any large town the introduction of the above would prove of great public convenience.

Dundee. THE TOWN SURVEYOR.

VENTILATION OF SOIL PIPES.

SIR,—Perhaps you will allow a mechanic a word or two on "sewer ventilation." I quite agree with your correspondent "F." in stating "that the pressure of the gas in sewers often exceeds the hydrostatic pressure of the water in the traps;" but I will go further, and state that the handle of most water-closets cannot be raised without a certain amount of foul air passing into the apartment. And why? Because while the water is rushing through the closet the water in the trap fluctuates and allows the compressed gas to pass. My suggestion would be to have an earthenware trap at the bottom of each stack of soil-pipe, thereby taking the pressure from off the top one, and a 1½ in. or 1½ in. pipe attached to the top part of the column, and carried to the highest part of the building, with a return bend to prevent it from being choked up; and, further, this escape-pipe would prevent the lead soil-pipe from so readily decaying.

Bell-traps are not only a nuisance, but an imposition on the public, and inspectors of nuisances would do well to condemn such sanitary blots in the improving laws of health. H.

Windsor.

THE CITY MEAT MARKET.

SIR,—I am much amazed that the new Meat Market should be called by the repulsive name of "Dead Meat Market." Surely there cannot be any reason for the word "dead." It appears to me there would be as much propriety in saying "a dead corpse" as "dead meat."

T. H.

*** We urged the objections to this unpleasant pleonasm some time ago, and, to a certain extent, with good result; but stupidity is always hard to conquer.

BRICK ARCHES ON CIRCULAR FACE.

SIR,—Would some of your subscribers kindly inform me how they would construct a 14-in. brick covering arch on 18-in. walls over windows in semicircular end of a room? The question is, bond; and how the thrust (horizontal) is to be counteracted. Any information on this unusual form of arch in light walls will oblige,

A CONSTANT SUBSCRIBER.

CHANGE OF COLOUR.

SIR,—Can any of your readers inform me of the cause of green marble paper, after being hung and varnished, turning red or foxey? J. F. S.

REMOVAL OF SNOW.

SIR,—Can any of your readers inform me if anything has yet been done in reference to the award of premiums offered by the City Commissioners of Sewers for suggestions for the removal of snow from the streets?

COMPETITOR.

RATING OF PUMPING STATION, OUTFALL SEWER, &c., TO GREENWICH PARISH.

IN the Court of Queen's Bench (sittings in Banco, before Justices Lush and Hayes), Mr. Justice Lush, in the case of The Queen *v.* The Metropolitan Board of Works, read the judgment of the court, which raised a question as to the liability of the Metropolitan Board of Works to be rated for certain portions of their outfall sewer, pumping station, and other works in the parish of Greenwich. He said there was nothing in the statutes under which the defendants were constituted, or the public sewers constructed or maintained, to exempt them from liability in respect of any rateable property they occupied, nor was there anything which prohibited the application of money in their hands to the payment of parochial rates. The only question, then, was whether the property referred to was rateable. As regarded the sewers, they were of

opinion that they were not rateable, on the simple ground that they were not the subject of beneficial occupation. No profit was derived from them by the Board. With respect, however, to the other property, they were of opinion that the rates were properly imposed. The wharfs, engine-house, pumping station, tramways, and appurtenances had an occupation value. The Board must have rented such property if they had not possessed it, and if the Board wished to let it they could easily have found a tenant. The order of sessions would be confirmed as to this property, and quashed as to the sewers.

CASES UNDER METROPOLITAN BUILDING ACT.

BAD BUILDING: A WARNING.

AT Marlborough-street, Mr. John Ashley, builder, of Grafton-street, Fitzroy-square, appeared to answer two summonses taken out against him by Mr. Baker, district surveyor; first, for neglecting to give notice of works; and, secondly, for constructing the front wall with broken bricks and rubbish, put together with inferior mortar, and not properly bonded.

Mr. Baker stated that, on receiving information that a new room was being built in rear of defendant's house, he immediately went there, and found the wall in question already raised 3 ft. or 4 ft., built entirely of brick-bats and what he should call mud, not mortar or cement. He desired the bricklayer to stop the work, and the next morning he served the usual notice to amend. Instead of complying with this the defendant hurried on the work, and at the expiration of forty-eight hours, when the surveyor went again, he found the wall not only completed, but, wet and unset as it must be, it was plastered inside and out, so that no one could then see the materials of which it was composed.

Mr. Venn appeared on behalf of the defendant, and admitted the neglect of notice, but pleaded that it was accidental. With regard to the work, he produced a sample brick of the finest quality, and then called Mr. Potter, a surveyor, who stated that he had seen the wall, and that it was a very good one, fit to carry another story if required; but, upon cross-examination, he admitted that he had only seen it since it was plastered, and knew nothing of the materials with which it was built.

After some further evidence, the magistrate, Mr. D'Eyncourt, suggested that another surveyor should be appointed, with power to strip the plastering and give an independent opinion, to which both parties agreed, and Mr. Caiger, surveyor to the police, was nominated. That gentleman attended the adjourned summons, and was sworn, when he fully corroborated the evidence of the district surveyor; and added that, in case of a frost, he thought the wall might burst and become unsafe.

Mr. D'Eyncourt thereupon ordered the defendant to pull down and amend the work within fourteen days; and in consideration of his heavy expenses of solicitor, two surveyors, and witnesses, he was fined in the nominal penalty of 1s. only, in addition to the other costs, namely,—Mr. Caiger, 2*l.* 2*s.*; Mr. Baker, 2*l.* 2*s.*; summonses, 4*s.*; total, 4*l.* 9*s.*

Defendant paid the money; and the magistrate congratulated him that the district surveyor had not employed a solicitor.

ROMAN CATHOLIC CHURCH-BUILDING NEWS.

Cloyne.—The corner-stone of St. Colman's new Catholic cathedral, diocese of Cloyne, was laid at Queenstown on the 30th of September, by Dr. Keane, bishop of the diocese. Messrs. Pugin & Ashlin are the architects. The style is Gothic, of a Continental type. The plan includes a nave, with north and south aisles, and transepts; baptistery, side chapels, chancel, apse, towers, and sacristies. The length is 190 ft. in the clear, and the width across the transepts 106 ft. in the clear. The nave is 34 ft. wide, and the aisles 18 ft. each, including the thickness of the nave walls. The main tower and spire will be erected at the south-west corner, and will reach a height of 300 ft. There will be six turrets, 120 ft. high, each, containing stairs to the triforiums and organ-gallery. The architects are putting in the foundations, as the depths to which excavations had to be made were so variable as to form an impediment in letting to a contractor. Mr. C. G. Doran is the clerk of works.

Uxbridge.—Dr. Manning has laid the foundation-stone of a new church at West Drayton. The dimensions of the intended building are 77 ft. by 44 ft.: its design is English Gothic of the fourteenth century. When completed it will be fitted to accommodate 500 persons. The architects are Messrs. Wilson & Nicholl, of Marylebone; and the builders, Messrs. Fassnidge, of Uxbridge. The site of the building adjoins the residence of the local priest, the Rev. Michael Wren.

Ongar.—The chief stone of a new church has been laid here by Canon Last, of Ingatestone. In the course of his address he said the church would be dedicated under the invocation of St. Helen, an Essex saint, born at or near Colchester. She was the daughter of Coël, and mother of Constantine the Great, the first Christian emperor. The church is from the designs of Mr. Cubitt Nicholl, architect to Lord Petre, and will be built of brick with Bath stone dressings. It will be in the Early English style, and so formed as to constitute the chancel of a future church, should its enlargement become necessary. The builder is Mr. Joseph Bostock, of Brentwood.

CHURCH-BUILDING NEWS.

Titley, Herefordshire.—The first stone of the new church was laid on the 30th ult. It will replace an edifice erected 100 years ago, and consist of nave, north aisle, south porch, chancel, organ chamber, and vestry. It is intended to retain the present tower. The fittings are to be of oak, and the church will accommodate 220 persons in open seats. Penrhos stone is being used for the walling, blue Pennant for the arcade shafts, and Bath for the dressings. The walls will not be plastered internally. The style of the church is Early Decorated, and the cost is estimated at 1,600*l.* The work is being carried out by Messrs. Lewis & Day, of Hereford, under the direction of the architect, Mr. E. Haycock, jun., of Shrewsbury.

Books Received.

Haydn's Book of Dates, relating to all Ages and Nations: for Universal Reference. Thirteenth edition—corrected to June, 1868. By BENJN. VINCENT. London: Edward Moxon & Co. 1868.

HAYDN'S "Book of Dates" has become a standard work of reference, and nothing more is needed on the appearance of a new edition than to let intending purchasers know that it can be had. Mr. Vincent became connected with the work in the preparation of the seventh edition, and from that time to this, when he issues the thirteenth edition, has gone on gathering, and condensing, and wedging in fresh facts. Haydn's original design was to give the greatest body of compressed information that had ever appeared in a single volume, and we are much disposed to say that this intention has been fulfilled. The number of facts and dates in the twelfth edition was certified by actuaries to be 34,563, and this number is now increased. The new edition must be regarded as a writing-table necessity.

Mr. Haydn left amongst his papers a plan for a Dictionary of Biography, as a companion to his Dictionary of Dates. This has been carried out under the care of Mr. J. Bernard Payne, and will be published shortly by Messrs. Moxon & Co.

The Art of Garnishing Churches at Christmas and other Festivals. By EDWARD YOUNG COX. London: Cox & Son, Southampton-street, Strand.

THIS book comes opportunely, and will be welcomed in many parishes, notwithstanding that other books on the same subject are available. Mr. E. Y. Cox, the author of this "Art of Garnishing Churches," is a member of a firm of church furniture manufacturers and ecclesiastical decorators, and it has been his aim to make his volume thoroughly practical, in which he has very well succeeded. Descriptions are given of the ornaments suitable for the different parts of the church and the necessary directions for making devices, banners, and inscriptions. Numerous lithographs and engravings, illustrating the designs of various architects, accompany the work, and also three or four photographs, representing the style of decoration recommended. The festoons across arches shown are a mistake.

The firm have since published an Illustrated Catalogue of shapes, cut to serve as groundwork for devices and other decorations, so that the whole affair is now brought down to the compass of the meanest capacity.

Miscellanea.

THEATRES IN RUSSIA.—The *St. Petersburg Gazette* reports that the erection of no fewer than ten theatres for the people, all to be situated in the workmen's quarters of the city, are to be begun forthwith, the plans having been approved of by the Minister of the Interior, under whose supervision they are to be placed.

BIG BLOCKS.—The Luxulyan Granite Company have just shipped at Charlestown, for the Hampton Waterworks, near London, some huge blocks of dressed granite, weighing from 8 tons to 11 tons and upwards. Two stones in particular, which have been prepared for cylinder beds, measure 10 ft. by 10 ft. 6 in., by 2 ft. deep, containing 210 cubic feet, and weighing over 14 tons each.

EXTENSION OF THE GENERAL POST-OFFICE.—The long line of houses opposite to the General Post-office, in St. Martin's-le-Grand, will shortly be removed, the whole of the property having been purchased for the Government. On the site occupied by the houses, buildings will be erected for post-office purposes, the increase of business having rendered more extended accommodation absolutely necessary.

NEW INFIRMARY FOR OLDHAM.—The Mansion-house Committee, out of the surplus fund, subscribed some years ago for the relief of the operatives during the cotton famine, have apportioned to Oldham, under an order of Chancery, 1,000*l.* towards the erection of a new infirmary, to cost 10,000*l.*, at that place, which hitherto has possessed no medical institution of its own, though its inhabitants number 90,000.

CHESTER CATHEDRAL.—The chief stone of the restoration works at this cathedral has been laid at the base of the north-east buttress of the Lady Chapel. In the evening the workmen engaged in the work of restoration, to the number of fifty, dined at the Blossoms Hotel, where, through the kindness of the Dean and Chapter, an excellent repast was provided. The Dean was present for a short time, and offered a few remarks upon the occasion on which they had met, and afterwards, Mr. Frater, taking the chair, the proceedings were of a thoroughly convivial character.

OIL PAINTING UPON ZINC.—Every painter is aware of the difficulty experienced in making oil colours adhere to articles of sheet zinc. Professor Boettger, however, has recently published a process by which, it is stated, that the desired result can be accomplished, this process consisting in the previous application, by means of a hard brush, of a mordant, composed of one part of chloride of copper, one part of nitrate of copper, one part of sal ammoniac, and sixty-four parts of water, to which is afterwards added one part of hydrochloric acid. The zinc turns of a deep black immediately after the application, changing after drying (twelve to twenty-four hours) to a dirty black, greyish-white shade, upon which any oil colour, once applied, will adhere with the greatest tenacity.

CLEVELAND INSTITUTE OF ENGINEERS.—From the annual report of this institution, read at the last general meeting, it appears that the most satisfactory progress has been made during the past year. In respect alike of funds and members, the society stands well; and the greatest interest was felt in, and impetus given to, the meetings of last year, in connexion with the valuable discussions which took place on the subject of the manufacture of steel from Cleveland iron. It is intended, if found practicable, to renew the discussion of this subject during the present session; and there can be little doubt but that it will be found productive of valuable results to the cause of Cleveland industry. The annual meeting of the institute was recently held, when the office-bearers for the ensuing year were elected. Mr. David Joy was appointed president, and Messrs. T. Wrightson and G. Whitwell hon. secs. A paper was, at the same time, read by Mr. Theodore West, of Darlington, on the "Weardale and Shildon Waterworks," which elicited a lively discussion.

"Executed in Terra-cotta."—Talking of the education question, a traveller observed that as he was walking on one occasion under the arcade of the horticultural garden, looking at the works of art displayed there, he came upon two well-dressed ladies examining a statuette of Andromeda, labelled "Executed in terra-cotta." "Executed in terra-cotta," says one; "where is that?" "I am sure I don't know," returned the other; "but I pity the poor girl, wherever it was."

The Drainage of the proposed Asylums.—We are told that it is definitely decided that Moule's dry-earth closets shall be introduced into the new asylums for lunatic paupers which are to be built, under Mr. Gathorne Hardy's Act, in the neighbourhood of London. If this be so, we are disposed to fear that a great mistake has been made. We trust that, at all events, the necessary arrangements for water-closets, drains, soil-pipes, and so on, will be made during the building of the asylums, or the result will probably be that costly alteration will be required hereafter.

Inventors' Institute.—The first meeting of the eighth annual session of this association was held at the offices, St. Martin's-place, on Monday evening, when Lord Richard Grosvenor, M.P., the president (elected in the place of the late Sir David Brewster), took the chair for the first time. Mr. Hume Williams delivered the inaugural address. A discussion followed, in which Mr. Savage; Mr. Paterson, of the Working Men's Club and Institute Union; Captain Selwyn, R.N.; Mr. C. W. Siemens, F.R.S.; Mr. Thomas Webster, Q.C.; Mr. F. W. Campin; and the president took part.

The "Tidy Box."—So Messrs. Jenner & Knewstub call a despatch-box they have patented, and so it is, for it enables the owner to put by letters, or bills, or other papers, under alphabetical arrangement. The box, of which the front as well as the top opens, contains a tray, in which are twenty-four upright movable divisions, lettered at the top, and which run on a wire at each side, and between these papers may be put away under the different letterings. The patentees consider with Pope, that "Order is Heaven's first law," and, doubtless, think the best sort of order an order for their despatch-box.

Increase of Fever in London.—Dr. Buchanan, medical officer of health for St. Giles's district, in consequence of the great increase of fever in the metropolis, has urged upon the local board of works the necessity of establishing a public disinfecting chamber for the purpose of purifying infected clothing, bedding, &c., pursuant to the Sanitary Act, 1866, sec. 23; and as a preliminary step the Board have invited the local boards of adjoining parishes to join with them in providing such an establishment. This is a measure which the medical officers of the metropolis have long urged upon their respective Boards, but without success in even a single instance.

The late Mr. G. R. Hartshorne.—We spare a corner of our paper to record the early death, from consumption, of Mr. G. R. Hartshorne, for twelve years one of the designers employed by Messrs. Hart & Son, the metal workers. He was first engaged by this firm in 1856, and placed under the instruction of Mr. W. G. Smith. He was a clever draughtsman and designer, and several times exhibited designs for iron and brass work at the Architectural Exhibition. Only a few days previously, another young but very clever draughtsman and designer, Mr. Fitch, originally apprenticed to the same firm as a pattern-maker, but of late employed as designer by Messrs. Benham, died at an early age of brain-fever.

Fall of a Malt Mill in Stockport.—About three o'clock on Friday, the 27th ult., the newly-erected malt-mill of Messrs. Yates & Son, High-street, Stockport, fell in, from the roof down to the ground-floor, nearly burying alive two of the maltsters—William Evans and William Pugh—who were engaged in the second and third rooms. The accident happened through an imperfection in one of the cross-beams in the upper rooms, which beam had given way under the weight of the malt upon it. For some time Evans could not be extricated from the *débris*, which had driven him against the wall; but fortunately he was dug out in time to save his life. No bones were broken. The damage to the property is estimated at about 200*l*.

English Church, Ceylon.—The foundation stone of a new English Protestant church was laid at Point de Galle, Ceylon, on the 30th of October, by the Lord Bishop of Colombo. Mr. James G. Smither is the architect.

Bolton Fine Arts and Industrial Exhibition.—An exhibition of paintings and other works of art, machinery in motion, and models, is to be opened in the New Mechanics' Institution, Bolton, by Mr. Anthony Trollope, on Monday next.

The Telegraphs and the General Post-office.—The arrangements for the purchase of the telegraphs by the Government are being actively carried on, and a commission appointed by the Accountant-general has nearly concluded the inquiry into what the net profits of the companies really are.

Sheffield Architectural and Archæological Society.—The annual general meeting of this society was held on Thursday in last week, at the School of Art. Mr. E. S. Howard occupied the chair. Mr. Fawcett, one of the secretaries, read the annual report, and Mr. J. D. Leader, the treasurer, presented a statement of accounts which showed that the year's income had just balanced the year's expenditure.

The Royal Society.—The annual meeting of the members of the Royal Society took place on Monday, the Festival of St. Andrew. Lieutenant-General Sabine, the president, delivered the address, in which he reviewed the principal scientific events of the past year. He was re-elected president. Dr. W. A. Miller, of King's College, was elected treasurer; and Mr. G. G. Stokes, M.A., of Pembroke College, Lucasian Professor of Mathematics in the University of Cambridge, and Dr. W. Sharpey, secretaries. Mr. W. H. Miller was elected foreign secretary. The following gentlemen were placed on the council:—Mr. John Hawkshaw, Lieut.-Colonel Alexander Strange, Sir William Fergusson, bart., Mr. F. A. Abel, Captain G. H. Richards, Captain Douglas Galton, Mr. John Marshall, Mr. Archibald Smith, Sir Benjamin Brodie, bart., Dr. W. B. Carpenter, Mr. J. Lockhart Clarke, Mr. Frederick Currey, Mr. W. H. Flower, Mr. Warren de la Rue, Mr. J. P. Gassiott, and Mr. Joseph Prestwich.

Protection of large Buildings from Lightning.—This subject was laid before the Paris Academy of Sciences, and M. Pouillet, since deceased, was entrusted to report fully upon it. This report was the other day laid before the Academy, and approved by that body. The *Engineer* gives a lengthened account of it. The first thing to be done is to establish a conductor, formed of square iron measuring 4-5ths in. on the side, which shall pass without interruption over every portion of the building to be protected: when the line is broken by towers, pavilions, or other erections, the conductor must pass up and down each, so as not to interrupt its course. This main conductor, of course, is modelled, as it were, to the form of the building, and often consists of several branches, particularly in the case of edifices, like the Louvre, where there are several blocks of buildings perpendicular and parallel to each other: it will also have many minor branches, for it must be placed in good communication with all the gutters, leads, and other large metallic surfaces on the roof. This great conductor or circuit must be placed in direct communication with a body of water which is never wanting. Ten or a dozen wells might be dug to receive each a conductor leading from the main circuit. Each lightning-rod must be placed in perfect communication with the main circuit.

TENDERS.

For new workhouse buildings, and out-offices, &c. a Valley, for the Holyhead Union. Mr. R. G. Thomas, architect:—

Williams	£4,585 0 0
Evans & Son	3,670 0 0
W. Williams	2,968 0 0
Chester	2,945 0 0
W. Jones	2,885 0 0
Griffiths	2,498 0 0
R. Jones (accepted)	2,100 0 0

For additions and alterations to the Wolverhampton Union Workhouse. Mr. Veall, architect:—

Crutchley	£1,023 0 0
Lovatt	979 7 10
Thompson (accepted)	960 0 0
Bowater	950 0 0

For the conversion of a house into a lace warehouse, Nottingham. Mr. S. Dutton Walker, architect:—

Acton (accepted)	£262 18 0

For model building in Fitzroy Market, Tottenham-court-road. Mr. H. S. Legg, architect. Quantities supplied:—

Harrison & Edwards	£19,035 0 0
Williamson	17,349 0 0
Hookley	16,565 0 0
Turner	16,277 0 0
Poole	15,989 0 0
Wilson	15,800 0 0
Bayes	15,618 0 0
Nightingale	15,225 0 0
Rudkin	15,093 0 0
Crockett	15,000 0 0
Till	14,900 0 0
Winship	14,820 0 0
Webb & Sons	14,655 0 0
Manley & Rogers	14,641 0 0
Hughesdon	14,450 0 0
Piper & Co.	14,379 0 0
Nutt & Co.	14,230 0 0
Scrivener & White	14,100 0 0
Cooper & Cullum	13,800 0 0
Baker & Constable	13,580 0 0
Johnson	13,539 0 0

For repairs, &c., to houses at Brompton. Mr. J. Coe, architect:—

Randall	£449 0 0
King & Sons	418 0 0
Johnson	383 0 0
Gordon	338 0 4
Stapley	330 0 0

For erecting four houses for Mr. J. Foster, at Slough. Drawings furnished by Mr. Pierse Arthur:—

Evans	£800 0 0
Jones	750 0 0
Shaw	720 0 0
Johnston	710 0 0

For chapel, West Ham-lane. Mr. T. Chatfeild Clarke, architect:—

Brine	£735 0 0
Sadd	732 0 0
Wire	696 0 0
Scrivener & White	691 0 0
Hosking	675 0 0
North	662 0 0
Clough	633 0 0

For the erection of schools in connexion with the King's-road chapel, Reading. Messrs. Wm. & J. T. Brown, architects. Quantities supplied:—

Simonds	£876 0 0
Sheppard	869 0 0
Kindell	867 0 0
Barnicoat	856 0 0
Matthews	848 19 0

For the construction of the Poultry Arcade, Nottingham. Mr. S. Dutton Walker, architect:—

Simpson & Lynam (accepted)	£720 0 0

For the erection of a stamping-room to factory, The Meadows, Nottingham. Mr. S. Dutton Walker, architect:—

Fish (accepted)	£141 2 0

For re-building the White Hart Hotel, Upper Norwood. Mr. Sextus Dyball, architect:—

	Total amount of Estimate.		Allow for Old Materials.	
Bowyer & Sons	£4,529 2 11	...	£150 12 2	
Tarrant	4,399 0 0	...	200 0 0	
Nixon	4,396 0 0	...	112 0 0	
Thompson	4,250 0 0	...	112 0 0	
Macey	4,198 0 0	...	40 0 0	
Kilby	4,196 0 0	...	127 0 0	
King & Sons	4,060 0 0	...	100 0 0	
Perry (accepted)	3,907 0 0	...	128 0 0	
Sawyer	3,853 0 0	...	...	

For erection of dwelling-house on the Lime Grove Estate, Putney, for Mr. J. E. Rabbett:—

Sutton (accepted)	£1,375 0 0

For rebuilding warehouse, Houndsditch, for Messrs. Lazarus & Rosenfelds. Mr. H. H. Collins, architect:—

Stuart & Bennett	£1,558 0 0
Cohen	1,050 0 0
Ball & Russell	967 0 0

For house at Reigate. Mr. J. F. Mathews, architect. Quantities supplied:—

Barnes	£960 0 0
Nightingale, Brothers	935 0 0
Nightingale, B.E.	928 0 0
Gage	925 0 0
Cook	918 0 0
Room	895 0 0
Holdsworth & Co.	875 0 0

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Errata.—In Mr. Waller's communication in our last number, at page 879, "Architectural Institute," should be "*Archæological Institute*," and "attributor," "*attribution*."

We are compelled to decline pointing out books and giving addresses.

All statements of facts, lists of Tenders, &c., must be accompanied by the name and address of the sender, not necessarily for publication.

Note.—The responsibility of signed articles, and papers read at public meetings, rests, of course, with the authors.

Advertisements cannot be received for the current week's issue later than **THREE o'clock p.m.,** *on THURSDAY.*

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